

STRUCTURE OF THIS MICROCARD (BASIC INSTRUCTIONS)

A02 = How to use
this microcard

A01 = Structure of microcard

B01 = Trouble-
shooting
chart

N01 = Service
information

	1					2					3					4																								
card											SIS																													
of																																								
-A-	***X*					X*XXX					XXXXXX					XXXXXX					*XXXXX					X														
-B-	*XXXXX					XXXXXX					XXXXXX					XXXXXX					XXXXXX					XXX														
C-	XXXXXX					XXXXXX					XXXXXX					XXXXXX					XXXXXX					XXX														
D-	XXXXXX					XXXXXX					XXXXXX					XXXXXX					XXXXXX					XXX														
E-	XXXXXX					XXXXXX					XXXXXX					XXXXXX					YXXXXX					XX														
F-	XXXXXX					XXXXXX					XXXXXX					XXX																								
G-	XXXXXX					XXXXXX					XXXXX																													
H-																																								
J-																																								
K-																																								
L-																																								
M-																																								
-N-	*XXXXX					XXXXXX					XXXXXX					XXX					*X XX*																			
	12345					67890					12345					67890					12345					678														
											1										2																			
																										Index														

N28 = Table of contents and
publication information

- 1 = Special features
2 = Safety and precautionary measures
3 = Test equipment and tools
4 = Installation position of components

- a. Read from left to right.
- b. Title of micropicture (appears on each micropicture).

E16	Product/component/test step	
	<u>Coordinate</u>	

c. Limits of section

			
Beginning	Mid-section	End	One-page section

A01		=> <=
-----	--	-------

HOW TO USE THIS MICROCARD

Trouble-shooting instructions for system:

EI-K

Descriptions, photographs, terminal designations and special features refer to the following vehicle:

Mercedes-Benz 560 SEL, SEC
8-cylinder engine 117.968

09.87 ->

These basic instructions are comprehensive trouble-shooting instructions. They must not be used as vehicle-specific instructions. Caution! Descriptions and photographs may deviate from the vehicle-specific brief instructions.

Mandatory set values, terminal assignments and special features should be taken from the vehicle-specific brief instructions only. For brief instructions, see table of contents Microcard KFZ-00..

A02	—	=> <=
-----	---	-------

SPECIAL FEATURES

Distributor-rotor correction

The ignition distributor features "ADVANCE" correction of the distributor rotor as a function of centrifugal force. See top picture, arrow.

This ensures that there is always an adequate insulation gap between distributor rotor and the neighboring distributor-cap electrodes even in the case of extreme ignition angles. A prerequisite is however extremely precise assignment (adjustment) between distributor rotor and distributor housing. Adjustment must be performed with a self-produced auxiliary tool.

Note: The ignition point cannot be adjusted by turning the ignition distributor, since it is specified by the EI-K control unit.

Cylinder recognition

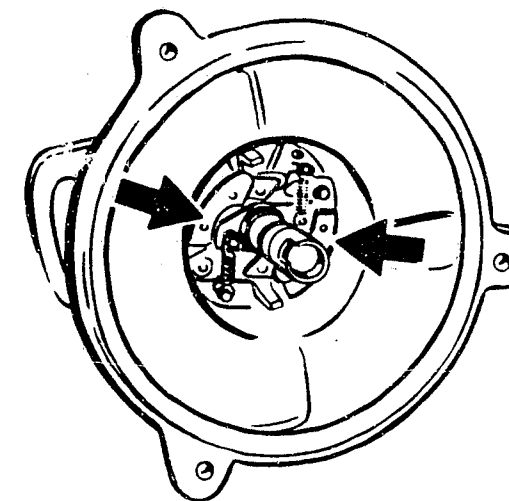
A pulse generator is provided in the ignition distributor for cylinder recognition (inductive). This sends an A.C. voltage signal to the EI-K control unit as the first cylinder passes. See center picture, items A (pulse generator) and B (timer core).

Transmission overload protection

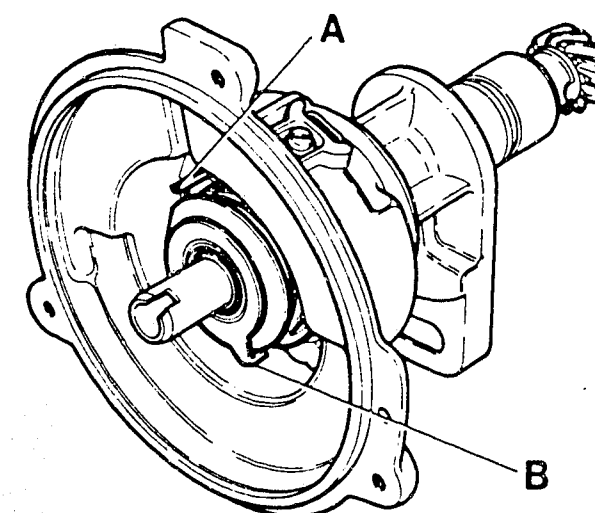
The EI-K control unit briefly (0.4 s) causes the ignition point to be retarded to 10° BTDC, so as to prevent overloading of the transmission brake bands when changing gear. Control/actuation is effected via the transmission overload protection switch. See bottom picture, arrow.

Maximum speed limitation

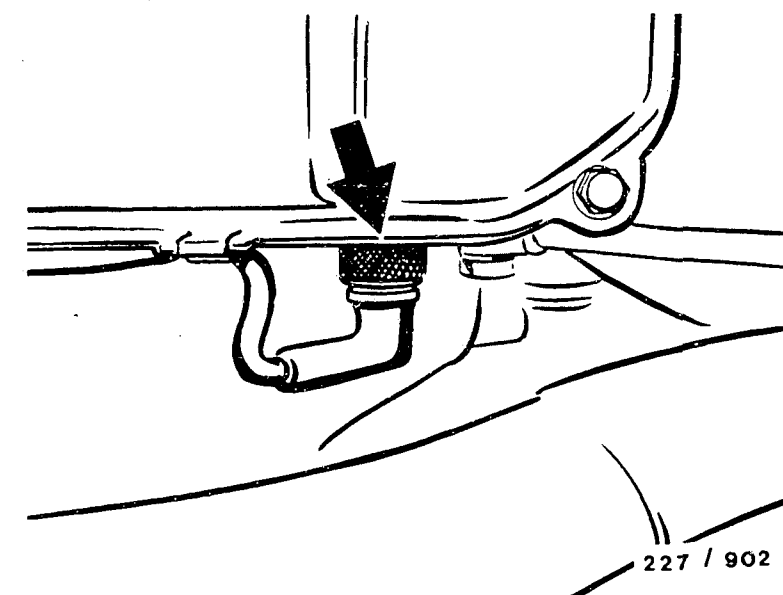
Upon attaining a maximum speed of approximately 250 km/h, a ground signal is switched to term. 2 of the EI-K control unit by the electronic speedometer. This causes the ignition point to be RETARDED and thus reduces the engine output. The maximum speed limitation is deactivated once a speed of approximately 245 km/h has been dropped below.



227 / 895



227 / 1181



227 / 902

SAFETY AND PRECAUTIONARY MEASURES

Be sure to observe safety and precautionary measures so as to avoid risk to persons and to prevent damage to the engine, trigger boxes, control units or the ignition system.

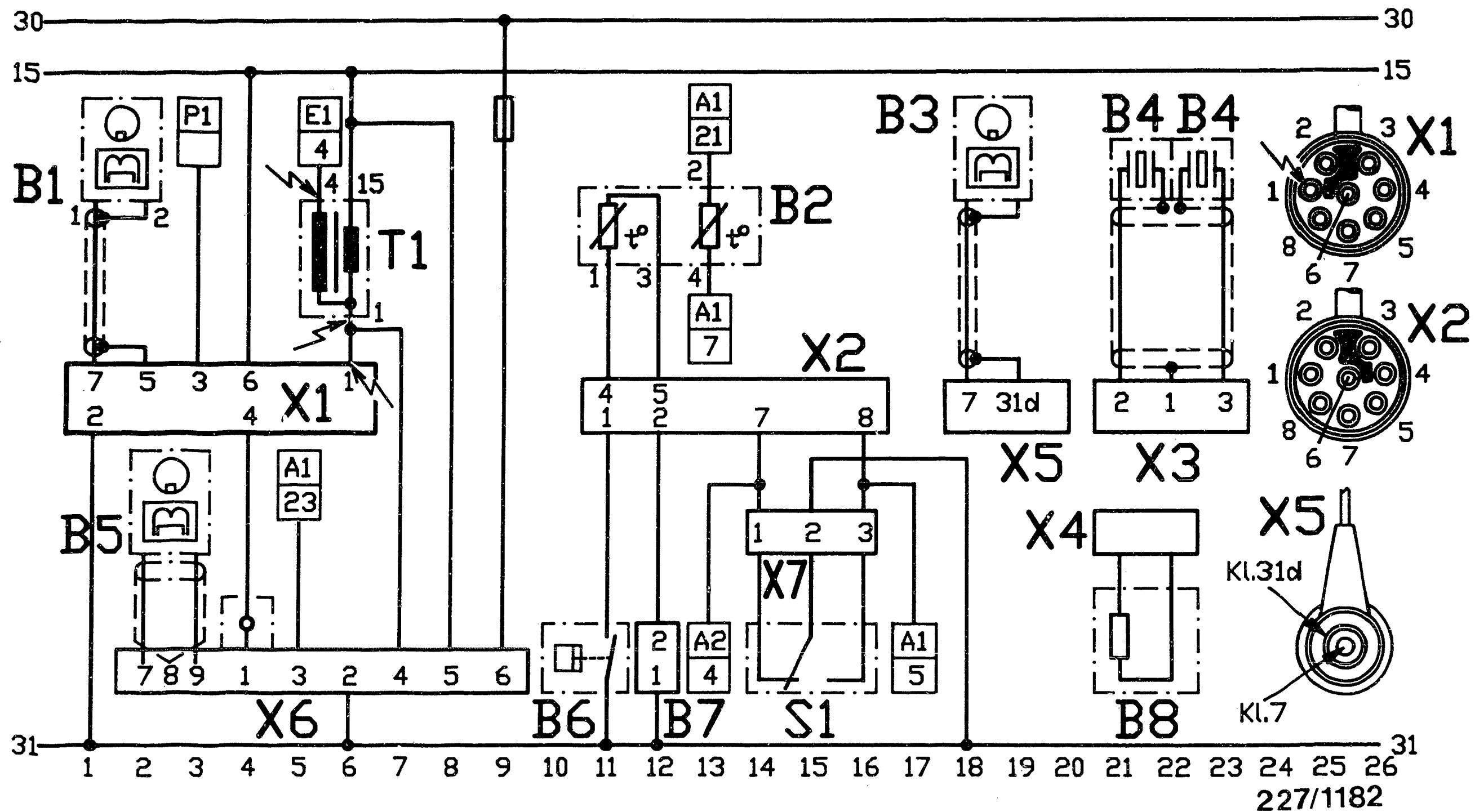
CAUTION!

High-energy ignition system with dangerous high and low voltages!

Touching live parts or terminals may be highly dangerous (both on the primary and secondary sides).

In this connection we would like to point out that VDE Regulations (in particular VDE 0104/7.67) or the pertinent local regulations are to be complied with when working on or testing the ignition system.

For production reasons:
continued on the following
coordinate.



High-tension arrows: Caution 400 V...25 kV

T1 = Ignition coil

X1 = EI-K control-unit plug (8-pole)

SAFETY AND PRECAUTIONARY MEASURES (CONTINUED)

Hazardous locations are marked with high-tension arrows taking the terminal diagram of an electronic ignition system as an example.

SAFETY AND PRECAUTIONARY MEASURES
(CONTINUED)

Never start engine without battery securely connected (battery terminals tightened).
Do not disconnect battery from vehicle electrical system with engine running.

Do not use a fast charger for starting the engine.
Provide starting assistance only with second 12 V battery and jump leads.
Caution! Owing to non-standardized requirements of vehicle manufacturers with regard to electronic products, we advise against using a 24 V battery for starting assistance.

When charging the battery in the vehicle or providing starting assistance, follow the operating instructions for the fast charger as well as instructions of the vehicle manufacturer.

Disconnect battery from vehicle electrical system before charging or fast-charging.

Incorrect polarity of the supply voltage, e.g. through incorrect connection of the battery or ignition coil, may lead to the destruction of a control unit.

Do not connect or disconnect wiring-harness plugs from control units or trigger boxes with the ignition on.

Remove control units at temperatures above + 80° C (paint-drying installation).

Remove control units before carrying out electric welding work.

SAFETY AND PRECAUTIONARY MEASURES
(CONTINUED)

When testing compression, detach EI-K control-unit plug - pulse generator or connect ignition coil, term. 4 permanently to ground using auxiliary cable (hazardous high tension, insulation damage to ignition coil, ignition distributor, ignition harness).

Note:

Auxiliary cable must feature at least 2 k Ω interference suppression, e.g. sleeve-type suppressor (5 k Ω) 0 356 500 001.

Prescribed ignition coil (see part no.) is not to be replaced by any other ignition coil.

A suppression capacitor is not to be connected to ignition coil, term. 1.

The positive terminal of the battery is never to be connected to term. 1 of the ignition coil. This would destroy the trigger box.

Never short-circuit ignition coil, term. 1 to ground (e.g. for switching off the engine). This would destroy the ignition coil and possibly also the EI-K control unit.

Never detach high-tension ignition cable of ignition coil and ignition distributor, term. 4 during operation.

There must never be any voltage flashover from ignition coil, term. 4 to ignition coil, term. 1 and term. 15.

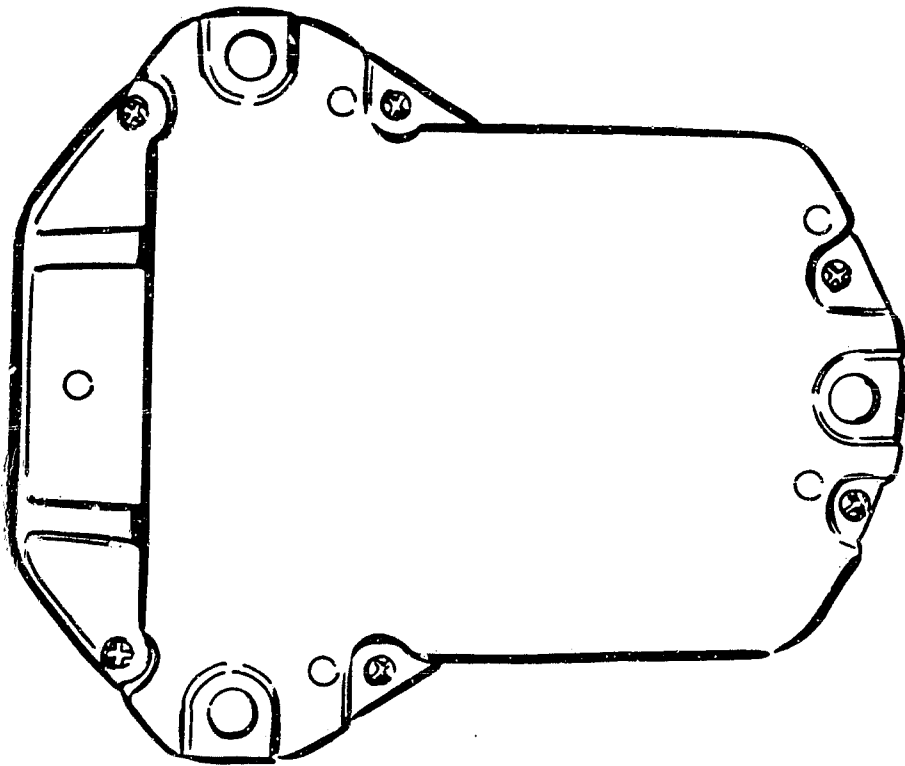
To prevent destruction of the EI-K control unit, the secondary side of the ignition system must be provided with at least 2 k Ω interference suppression and the original distributor rotor must be installed with 1 k Ω .

SAFETY AND PRECAUTIONARY MEASURES
(CONTINUED)

Incorrect indication of engine speed, dwell angle and ignition point:

Engine speed, dwell angle and ignition point may be incorrectly indicated on testers with this ignition system (EI-K control unit with current limitation).

See coordinates N10-N12 for more details



227 / 557

SAFETY AND PRECAUTIONARY MEASURES
(CONTINUED)

The base plate (see picture, bright area) must be coated with a thermal conduction compound before fitting the EI-K control unit.

A suitable tool must be used to apply the thermal conduction compound (screwdriver or the like).

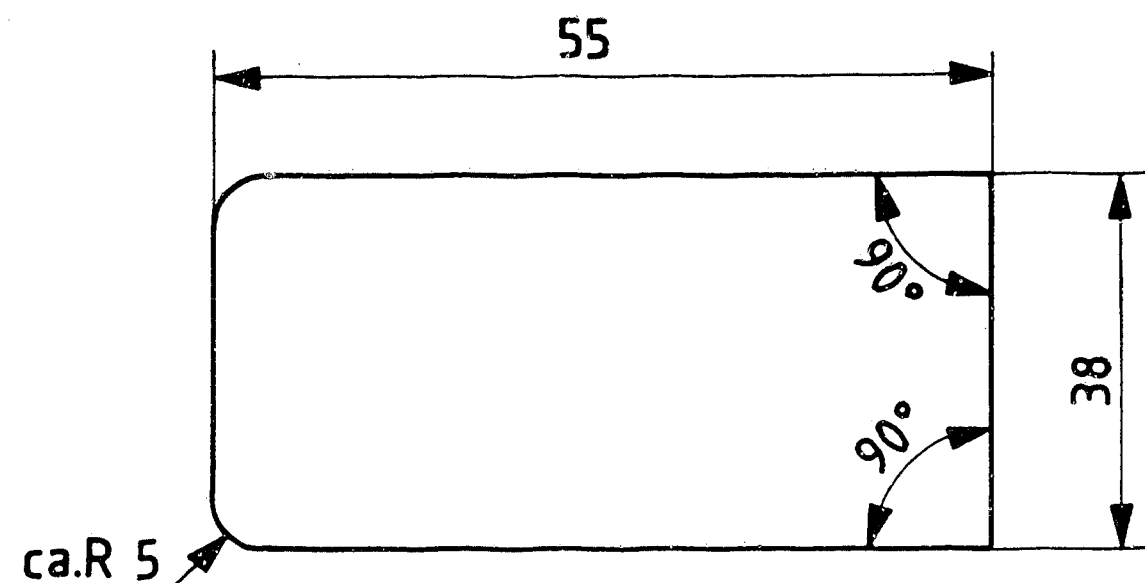
Never apply thermal conduction compound to painted parts.

TESTERS AND TOOLS

Motortester e.g. MOT 206	0 684 000 206
Pulse-shaping circuit (required for measuring primary voltage with MOT 201,206 and 400)	1 684 463 154
Adapter lead for diagnosis socket	1 684 463 094
Sleeve-type suppressor 5 k Ω	0 356 500 001
Ohmmeter ETE 014.00 or e.g. Pontavi Wh 2	0 684 101 400 Commercially available
Voltmeter e.g. ETE 014.00	0 684 101 400
Test leads (for proper connection of testers to connectors)	KDZS 0004 KDZS 0005
Black test prod Red test prod (for proper connection of testers to connectors)	1 684 485 034 1 684 485 035
Clamp-on test prod, measurement lead (evaluation of self- diagnosis)	Commercially available

TESTERS AND TOOLS (CONTINUED)

Evaluation unit (evaluation of self-diagnosis)	KDAW 9980
Thermal conduction compound	5 942 860 003
Torque wrench Range 5...60 Nm	Commercially available



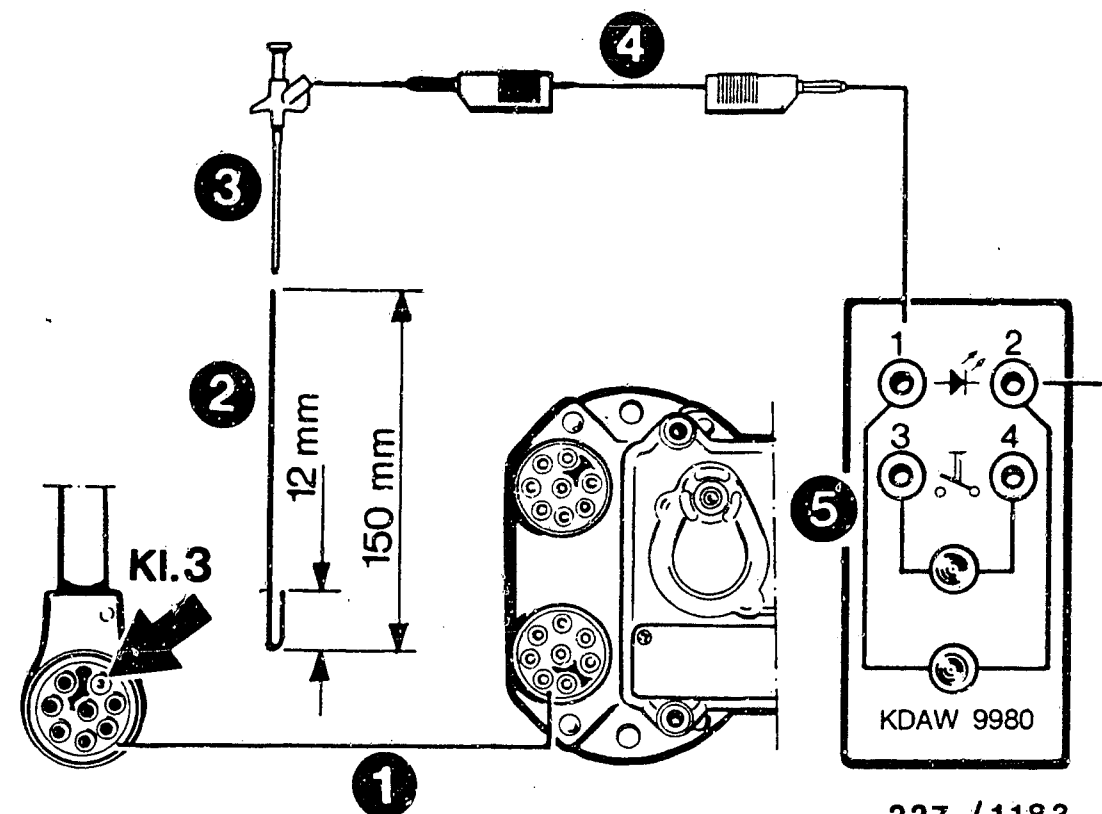
227/889

TESTERS AND TOOLS (CONTINUED)

Self-produced auxiliary tool

An auxiliary tool as indicated in the sketch is required for anti-parallax adjustment of the ignition distributor.

Material: sheet steel, approx. 1 mm thick.

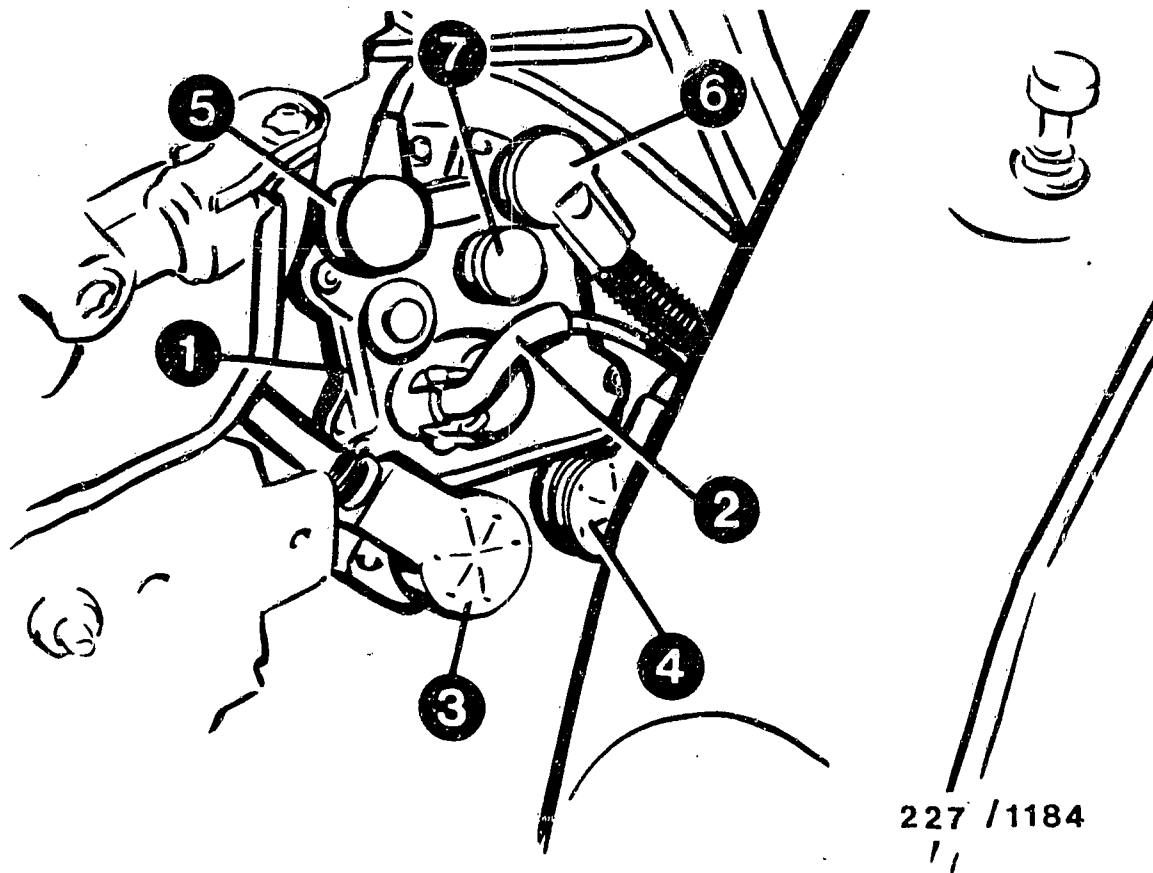


227 / 1183

- 1 = EI-K control-unit plug
- 2 = Self-produced strand
- 3 = Clamp-on test prod
- 4 = Measurement lead
- 5 = Evaluation unit KDAW 9980

TESTERS AND TOOLS (CONTINUED)

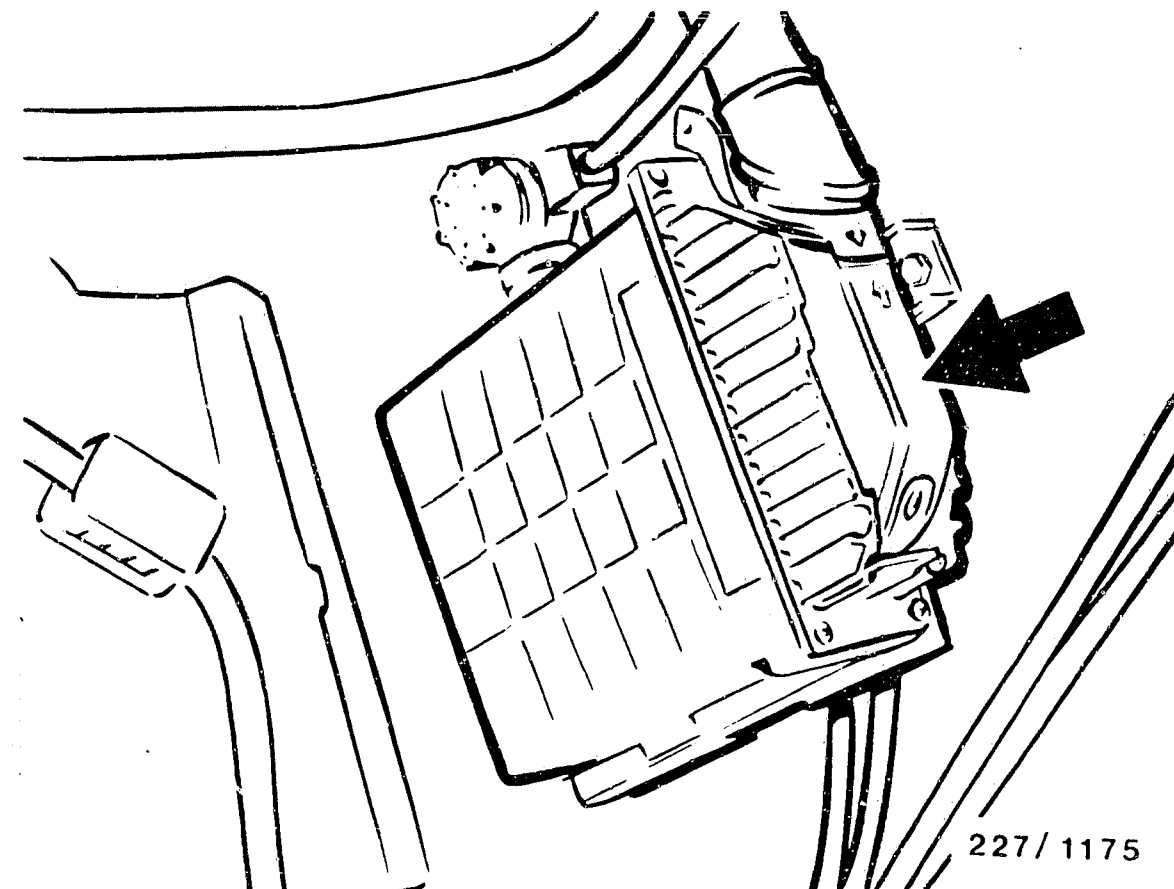
Produce strand (approx. 0.25 mm diameter) from for example 1.5 mm ² cable as shown in sketch. Bent side of strand is inserted into detached EI-K control-unit plug, term. 3 for assessment of flashing code.



- 1 = EI-K control unit
- 2 = Vacuum hose
- 3 = 8-way plug
- 4 = 8-way plug
- 5 = Coaxial plug - pulse generator
- 6 = 3-way plug - knock sensors
- 7 = Trimming coupling

INSTALLATION POSITION OF COMPONENTS

EI-K control unit is located at wheelhouse, front left.

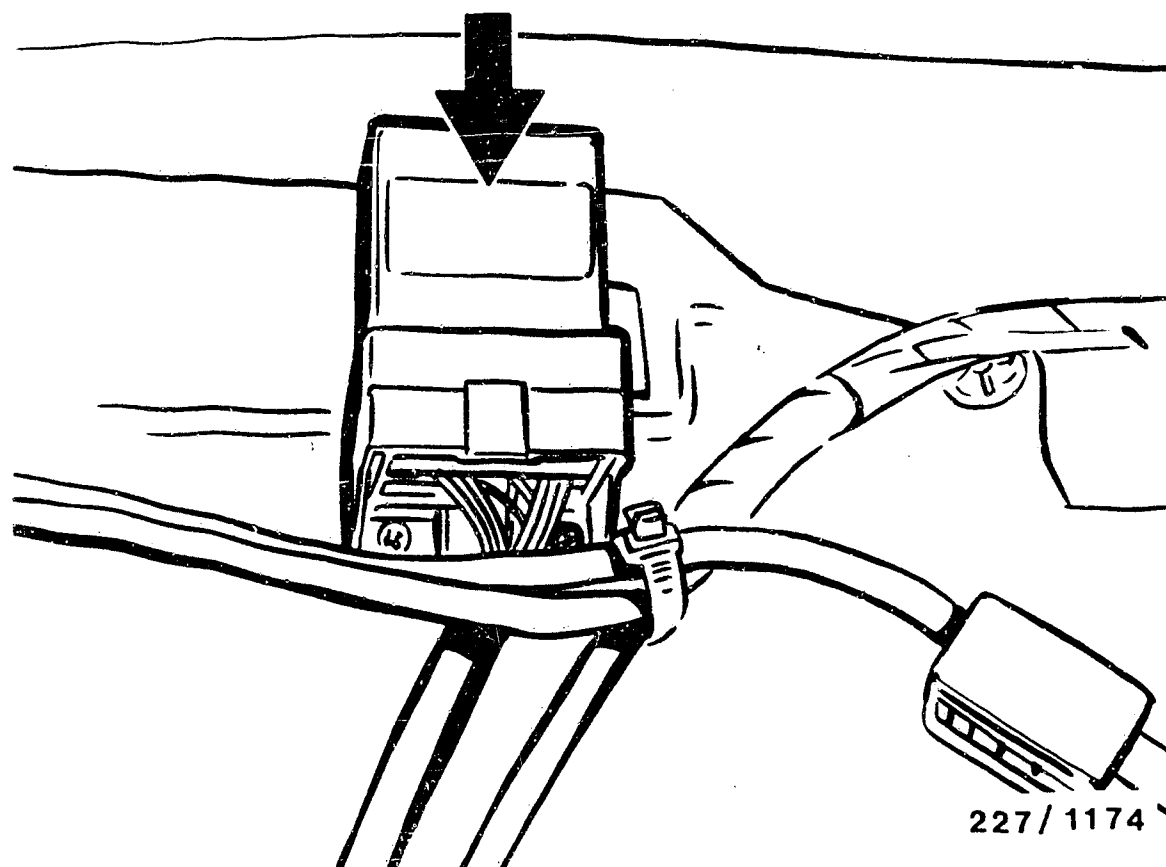


Arrow = KE-Jetronic control unit

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

Removal instructions:

Remove side panel in passenger compartment, front right.

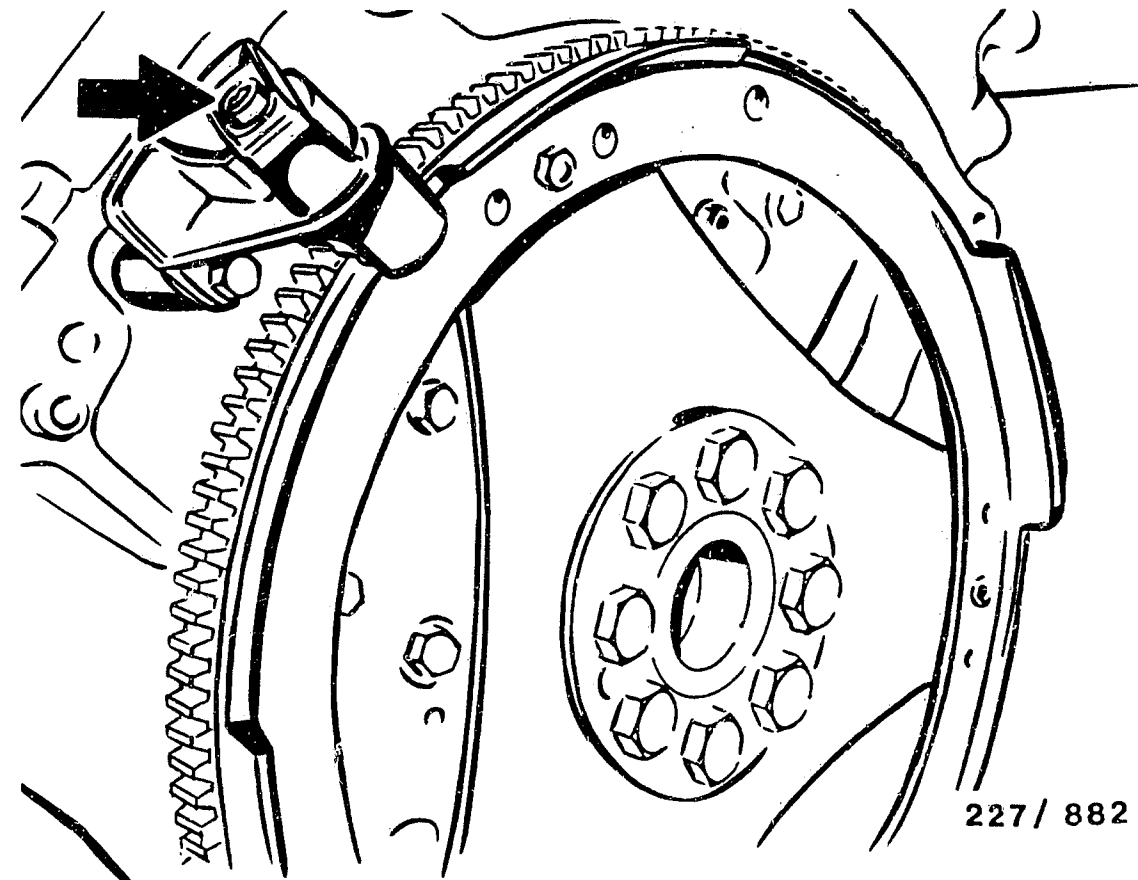


Arrow = Control unit (idle-speed regulation)

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

Removal instructions:

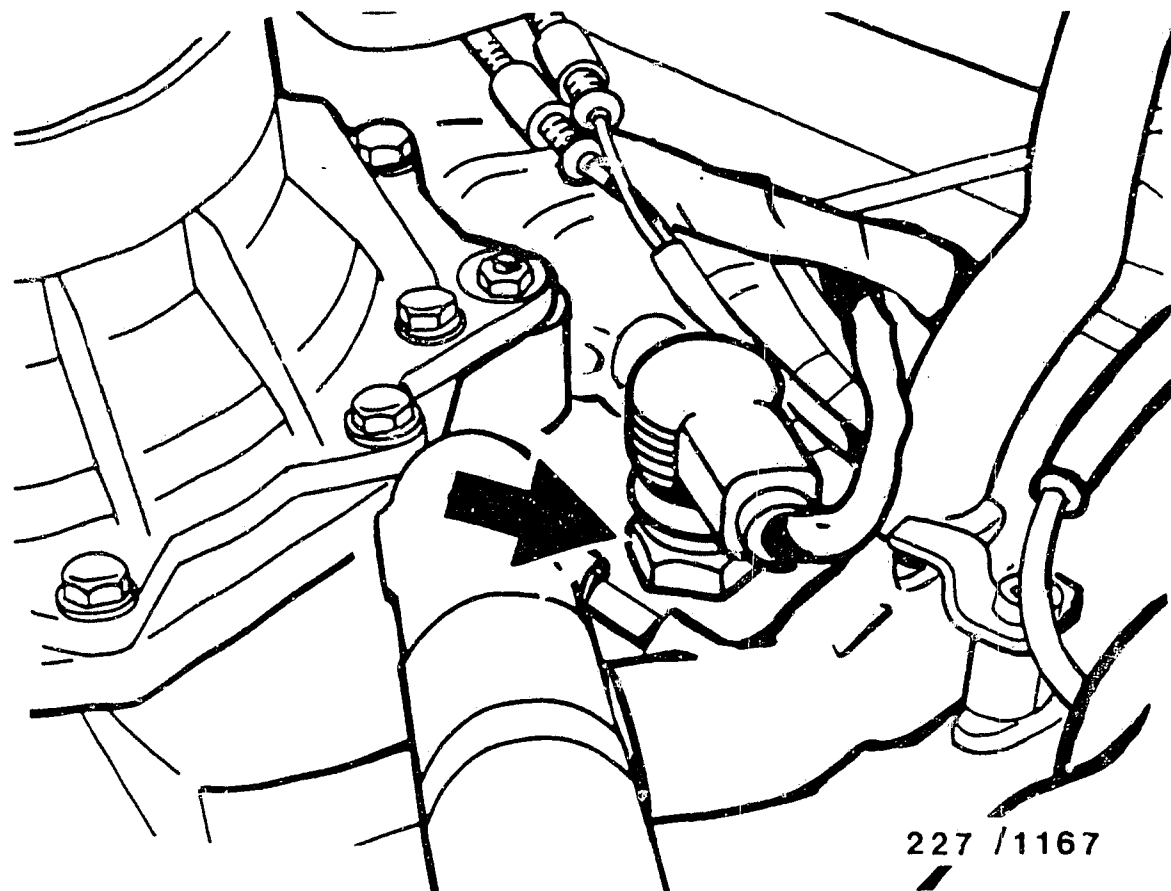
Remove floor mat, front right.
Remove foot support.



Arrow = Pulse generator

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

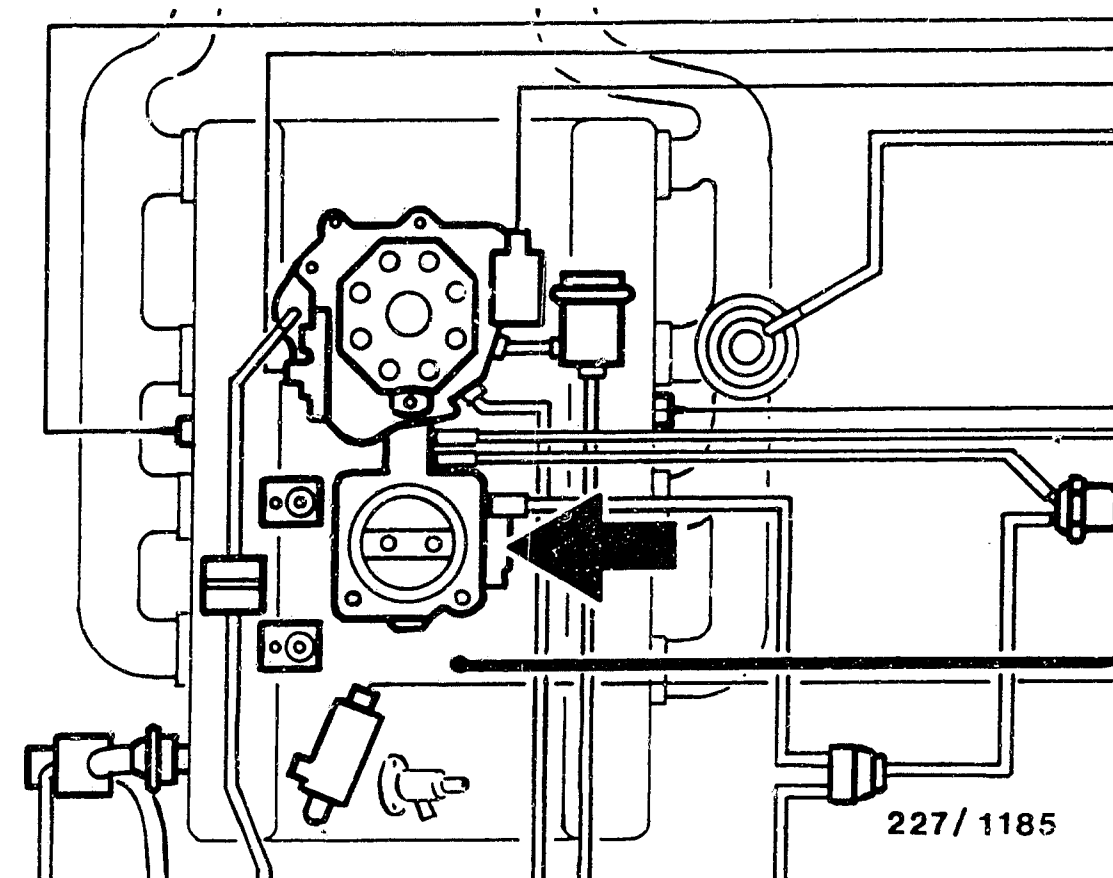
The pulse generator is located at the engine block on the left in the direction of travel.



Arrow = Temperature sensor (coolant)

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

The temperature sensor (coolant) is located between the ignition distributor and the mixture-control unit.



Arrow = Throttle-valve switch

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

The throttle-valve switch is located at the throttle-valve assembly.

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

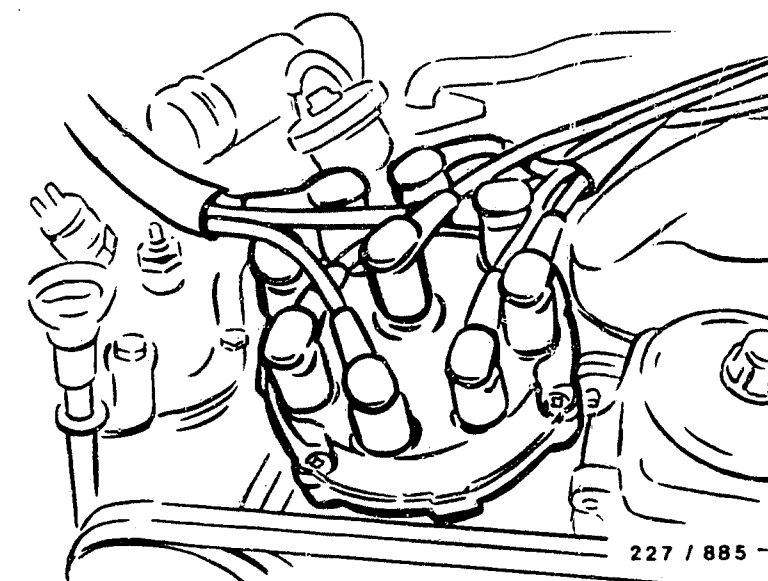
Ignition distributor

Removal instructions:

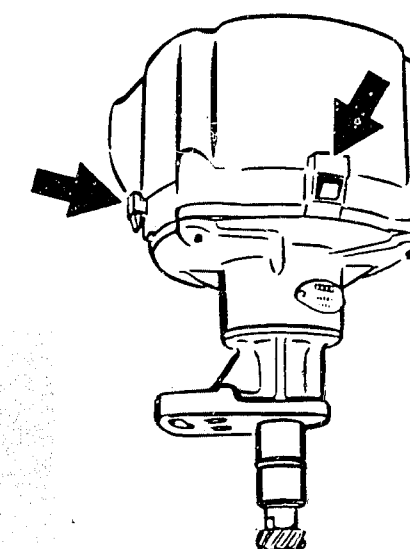
To remove the cover, unclip the 3 straps (arrows on center picture) and pull cover upwards.
The distributor cap is screwed to the ignition distributor together with the protective cap for long-distance interference suppression by means of special screws (bottom picture, arrow).

Pulse generator (cylinder recognition)

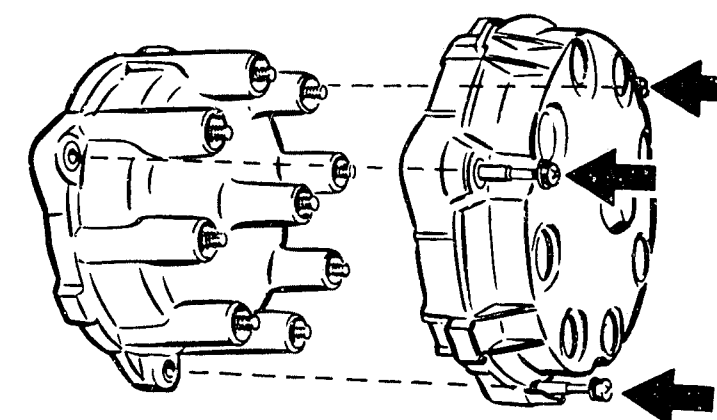
Located in ignition distributor (not illustrated).



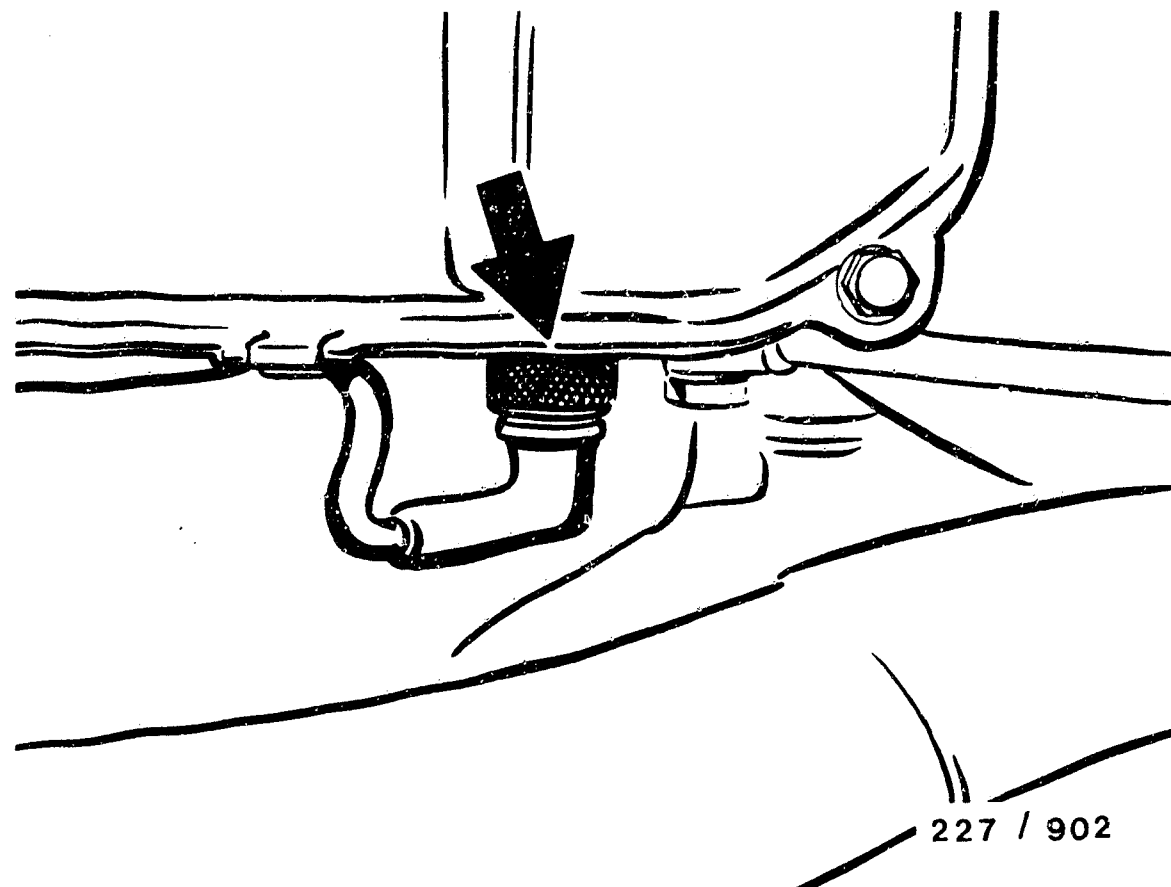
227 / 885 -



227 / 886



227 / 887



Arrow = Transmission overload protection switch

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

For production reasons:
continued on the following
coordinate.

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

Knock sensors

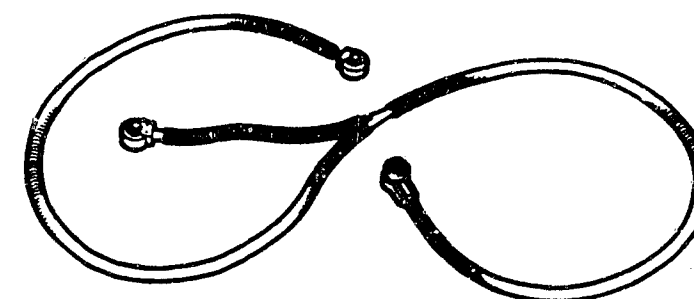
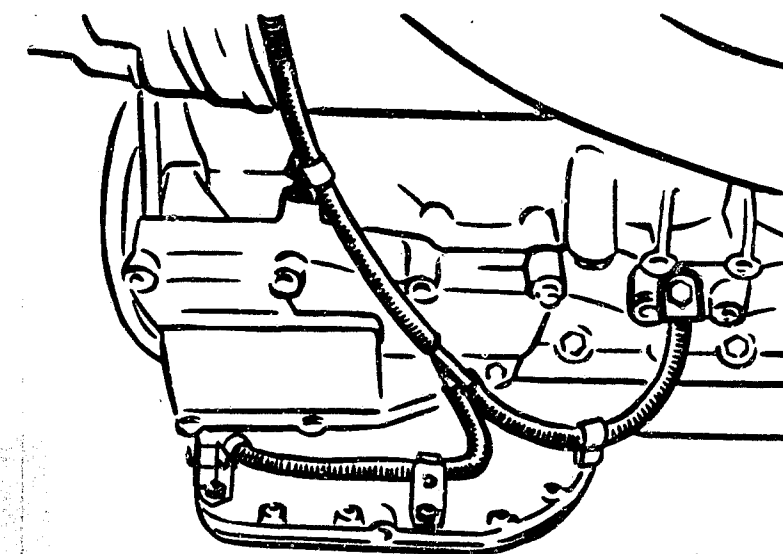
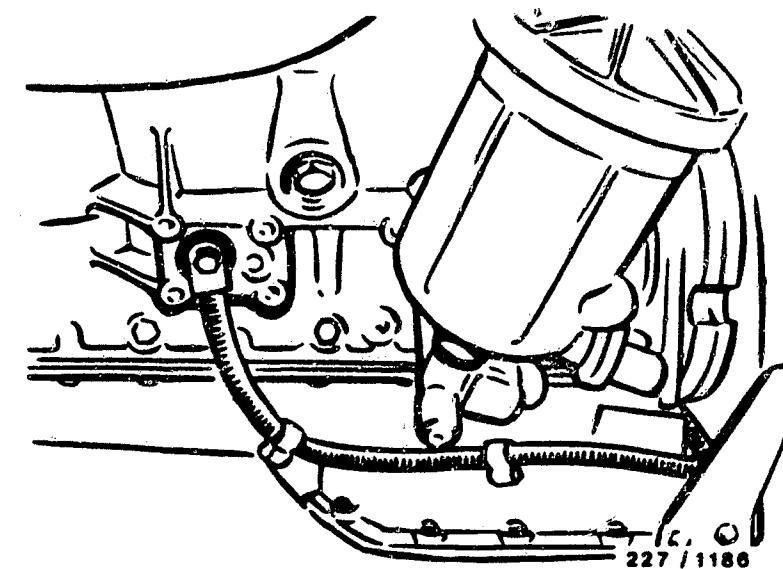
Removal instructions:

The engine brackets must be removed in order to take out the knock sensors. See top or center picture.

Note:

The leads of the two knock sensors are bunched together in a protective conduit (corrugated hose) and can only be replaced as a unit. See bottom picture.

When attaching the knock sensors, care is to be taken to ensure that the side of the knock-sensor housing does not make contact with the engine bracket. Fit fastening screw of knock sensor without washer, spring lock washer, tooth lock washer or the like.



HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM

The TROUBLE-SHOOTING CHART starts on Coordinate B04 and contains customer complaint (fault symptom) with several possible causes (component faults) in each case as well as coordinate references for detailed trouble-shooting. If no coordinate reference is given, it is a cause for which test instructions are not required.

If the customer complaint is clear, proceed with trouble-shooting in the given order of possible causes, one after the other and step by step.

Trouble-shooting should always start with the self-diagnosis (if available) or with the universal test adapter (if provision is made). Only then continue with the trouble-shooting chart.

If the customer complaint is not clear, check all the causes given in the trouble-shooting chart. In order to prevent possible incorrect measurements, check all causes in the order given (because of the interlinking of test steps).

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM (CONTINUED)

The TROUBLE-SHOOTING PROGRAM contains all system and component checks mentioned in the trouble-shooting chart. It is divided into three rows of boxes.

The left-hand column contains test instructions and set values.

The center column contains instructions on trouble-shooting and fault rectification. The right-hand column contains the illustrations/terminal diagrams belonging to the text, with explanations.

If the questions in the left-hand column can be answered clearly with "yes", continue trouble-shooting with the next box down.

If the answer to the question is "no", branch to the center column and carry out the tests in the order given there.

After the fault has been rectified, repeat the test as a check.

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM (CONTINUED)

TEST CONDITIONS:

- Battery fully charged
- Engine mechanically O.K.
(e.g. compression, valve clearance etc.)
- Engine at operating temperature approx. +80°C (if necessary)
- All connectors of wiring harness correctly seated

TROUBLE-SHOOTING CHART

Customer complaint (fault symptoms)

1. Starting motor operates, engine fails to start or starts only with difficulty.
2. Engine starts but then dies.
3. Idle problems
(engine speed, exhaust gas).
4. Poor throttle take-up, flat spot during acceleration.
5. Engine missing
(ignition, injection).
6. Maximum engine power/top speed not reached.
7. Fuel consumption too high.
8. Engine running on.
9. Engine pinging/knocking.
10. Engine overheating.
11. Fault lamp.

												Cause (component fault)	Coord.
*	*	*	*	*	*	*	*	*	*	*	*	Self-diagnosis	B07
*				*								High-tension side	C15
*												Firing sequence	—
*				*								Ignition coil	C17
				*								Ignition-distributor adjustment (high-tension side)	C19
*												EI-K control-unit voltage	C23
*												Primary-circuit voltage	C25
*												Pulse-generator insulation	C27
*												Pulse-generator internal resistance	D01

TROUBLE-SHOOTING CHART (CONTINUED)

Customer complaint (fault symptoms)

1. Starting motor operates, engine fails to start or starts only with difficulty.
2. Engine starts but then dies.
3. Idle problems (engine speed, exhaust gas).
4. Poor throttle take-up, flat spot during acceleration.
5. Engine missing (ignition, injection).
6. Maximum engine power/top speed not reached.
7. Fuel consumption too high.
8. Engine running on (dieseling).
9. Engine pinging/knocking.
10. Engine overheating.
11. Fault lamp.

										Cause (component fault)	Coord.
*										Contact resistances (primary side)	D05
*										Primary signal	D07
*										Peak-coil-current cutoff	D09
				*						Voltage, EI-K control unit, ignition coil (engine idling)	D11
				*						Primary voltage	D13
*	*	*	*	*	*	*	*	*	*	Ignition angle	D15
		*								Throttle-valve switch (idle)	D17
				*						Throttle-valve switch (full load)	D19

HOW TO USE SELF-DIAGNOSIS, SELF-DIAGNOSIS TEST TABLE AND TROUBLE-SHOOTING PROGRAM

This vehicle is equipped with a control unit which has a self-diagnosis feature. Therefore, start trouble-shooting with the self-diagnosis.

How to activate the self-diagnosis is described starting on Coordinate B09. The self-diagnosis test table starting on Coordinate B25 contains:

- Fault indication (flashing code)
- Components or system functions under test
- Test instructions/test conditions
- Connection terminals
- Set-value specifications
- Coordinate references for trouble-shooting and fault rectification in the subsequent self-diagnosis trouble-shooting program.

HOW TO USE SELF-DIAGNOSIS, SELF-DIAGNOSIS
TEST TABLE AND TROUBLE-SHOOTING PROGRAM
(CONTINUED)

The self-diagnosis trouble-shooting program starting on Coordinate ■ is divided into 3 columns.

The left-hand column contains test instructions and set values.

The center column contains instructions on trouble-shooting and fault rectification.

The right-hand column contains the illustrations/terminal diagrams belonging to the text, with explanations.

If the questions in the left-hand column can be answered clearly with "yes", continue trouble-shooting with the next box down.

If the answer to the question is "no", branch to the center column and carry out the tests in the order given there.

If the self-diagnosis indicates a fault, but no system or component fault has been found during trouble-shooting, try replacing the control unit.

If the self-diagnosis indicates no further system-specific faults and the customer complaint (fault symptom) has still not been eliminated, trouble-shooting must be continued with the trouble-shooting chart as of coordinate ■.

Test prerequisites:

- Voltage supply at EI-K control-unit plug, term. 6 (+) and term. 2 (-) O.K.
- Engine can be operated at in excess of 5000 min⁻¹.

For production reasons:
continued on the following
coordinate.

HOW TO USE SELF-DIAGNOSIS, SELF-DIAGNOSIS TEST TABLE AND
TROUBLE-SHOOTING CHART (CONTINUED)

Evaluation of flashing code

The self-diagnosis is output in the form of a flashing code. The flashing code consists of a maximum of 9 flashing pulses. See top picture.

The flashing pulses are detected with the evaluation unit KDAW 9980 and evaluated (counted) by the person performing the test.

Note:

The hatched area in the picture signifies that a voltage pulse is present (lamp lights up).

The flashing-pulse duration and the subsequent pause last for approx. 0.5 s (function of engine speed) in each case when the engine is idling.

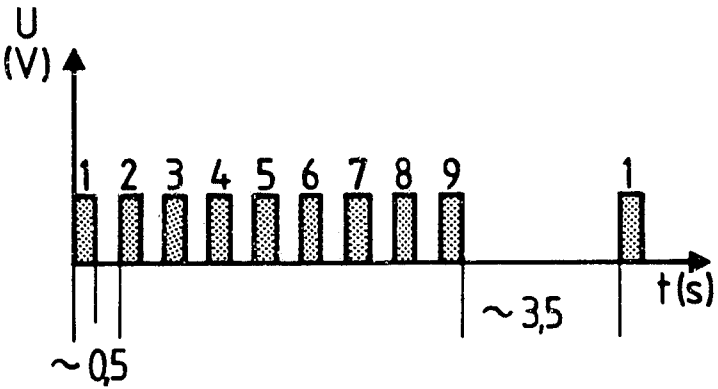
Transmission of the last flashing pulse is followed by a pause with a duration of approximately 3.5 seconds.

The top and bottom pictures illustrate flashing code 9 and flashing code 1 respectively by way of example.

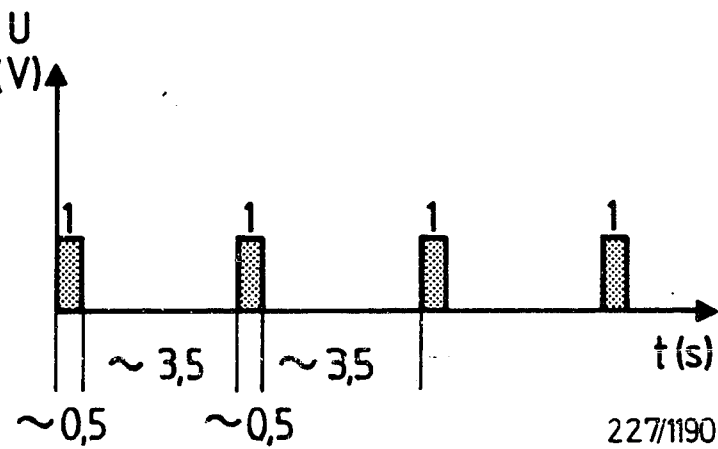
Only 1 fault is ever indicated with this self-diagnosis system. The first fault indicated must be eliminated before further faults can be interrogated.

If the EI-K control unit detects several faults, the fault with the highest priority is always indicated. Priority decreases with increasing flashing code (flashing code 2 = highest priority).

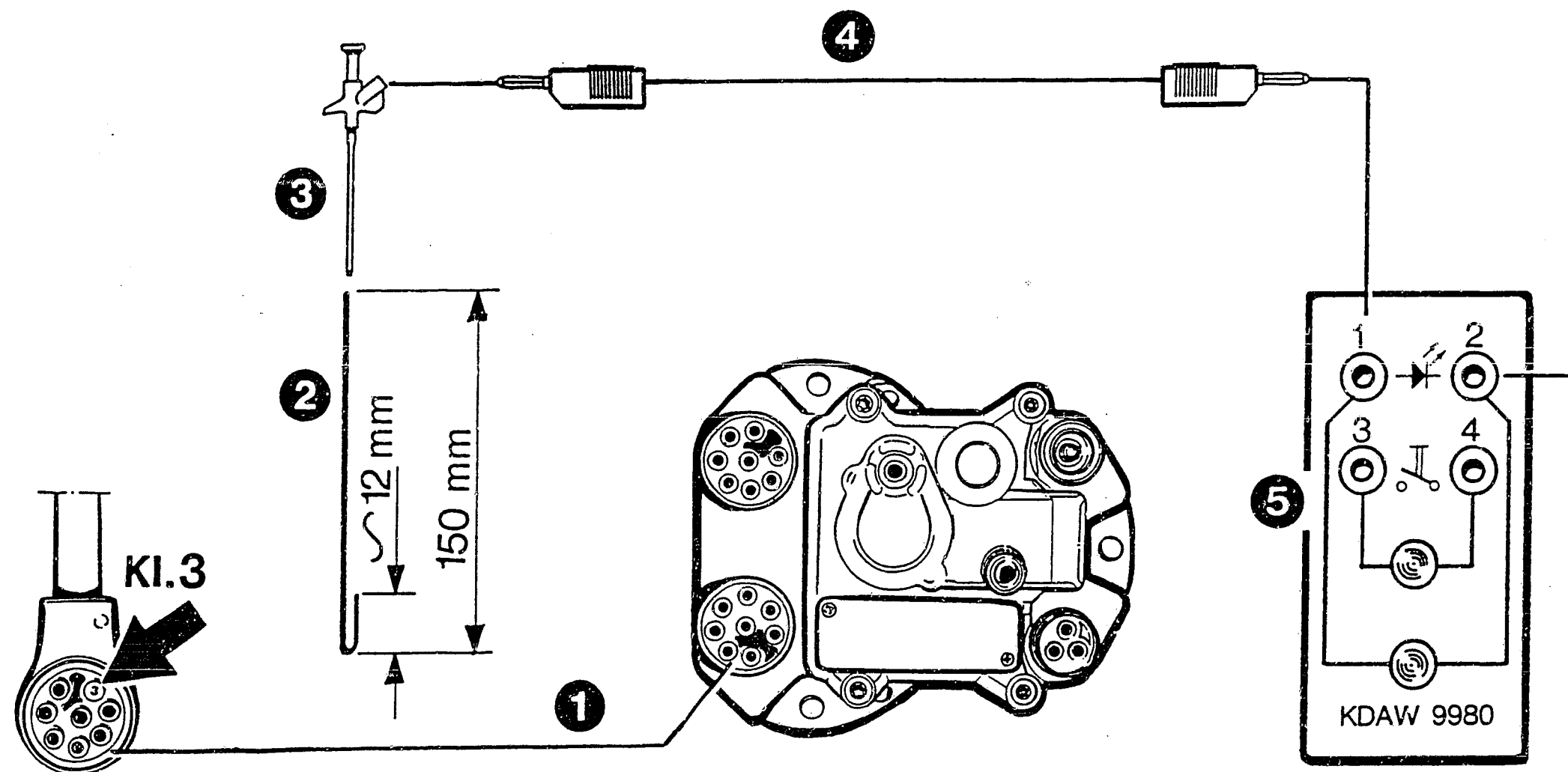
The EI-K control unit has a volatile memory. This means that the FAULT MEMORY IS CLEARED when the ignition is switched OFF.



227/1189



227/1190



227 / 1183

1 = EI-K control-unit plug
2 = Self-produced strand

3 = Clamp-on test prod 5 = Evaluation unit KDAW 9980
4 = Measurement lead

HOW TO USE SELF-DIAGNOSIS, SELF-DIAGNOSIS TEST TABLE AND TROUBLE-SHOOTING CHART (CONTINUED)

P r e p a r a t i o n

Remove rear headlamp cover in the case of vehicles with hydropneumatic suspension. Detach EI-K control-unit plug. Insert bent end of self-produced strand (see testers and tools) into term. 3 of detached EI-K control-unit plug. See picture. Carefully attach EI-K control-unit plug with strand (approx. 0.25 mm diameter). Connect strand, clamp-on test prod and measurement lead as shown in the picture to socket 1 of the evaluation unit.

C a u t i o n : Strand must not come into contact with vehicle ground or other plug contacts.

Connect socket 2 of evaluation unit to vehicle ground with measurement lead.

Ignition ON. Evaluation-unit lamp must light up.

If lamp does not light up, detach EI-K control-unit plug (ignition OFF) and improve strand contact at EI-K control-unit plug until lamp lights up.

HOW TO USE SELF-DIAGNOSIS, SELF-DIAGNOSIS TEST TABLE AND TROUBLE-SHOOTING CHART (CONTINUED)

IMPORTANT: COMPLY WITH SEQUENCE OF ACTIVATION

ACTIVATION OF SELF-DIAGNOSIS OF FLASHING CODE 1-2-3-4-6-7-9

Vacuum hose is attached to EI-K control unit. See picture, item 2

Ignition OFF.

Ignition ON. Let engine idle for 1 minute.

Interrogate flashing code (count flashing pulses).

NOTE: Diagnosis runthrough including pauses is repeated until the ignition is switched off.

Ignition OFF. Eliminate fault.

Activation with subsequent fault elimination must be repeated until flashing code 1 (no fault stored) is indicated.

ACTIVATION OF SELF-DIAGNOSIS OF FLASHING CODE 1-5-7

Vacuum hose is connected to EI-K control unit.

Ignition OFF.

Ignition ON.

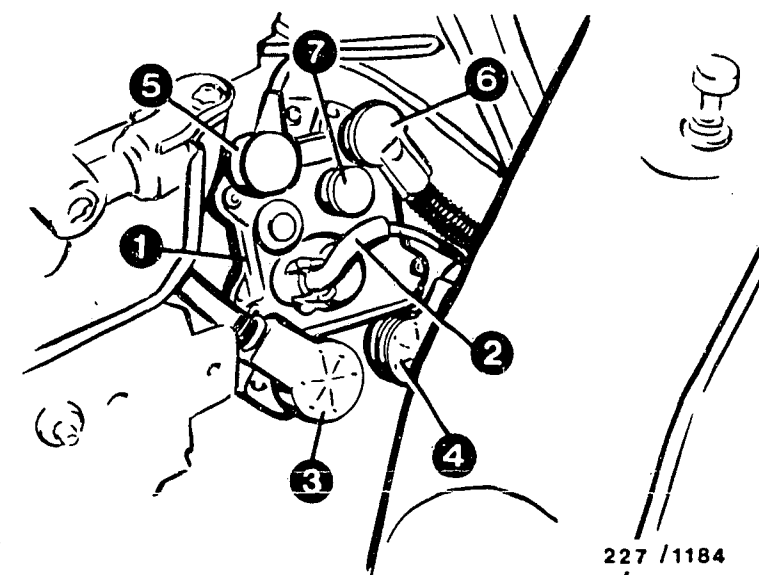
Run engine for 10 s at 3100..3500 min⁻¹.

Let engine idle.

Interrogate flashing code (count flashing pulses).

Ignition OFF. Eliminate fault.

Activation with subsequent fault elimination must be repeated until flashing code 1 (no fault stored) is indicated.



HOW TO USE SELF-DIAGNOSIS, SELF-DIAGNOSIS TEST TABLE AND
TROUBLE-SHOOTING CHART (CONTINUED)

ACTIVATION OF SELF-DIAGNOSIS OF FLASHING CODE 1 and 8

Ignition OFF.

Detach vacuum hose at EI-K control unit.
See picture, item 2

Allow engine to idle.

Shift automatic selector lever with engine idling from " P " to " D "
and back to " P " (observe safety precautions).

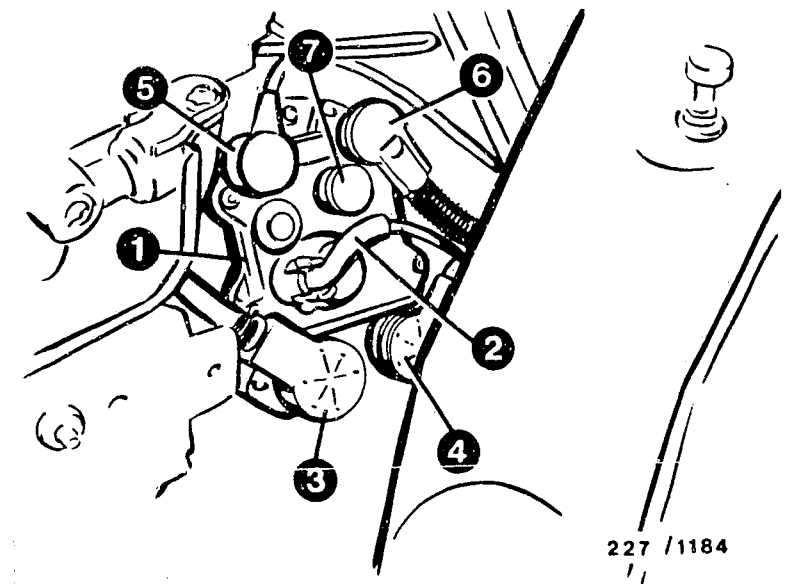
Run engine for 2 s at in excess of 5000 min⁻¹.

Allow engine to idle.

Interrogate flashing code (count flashing code).

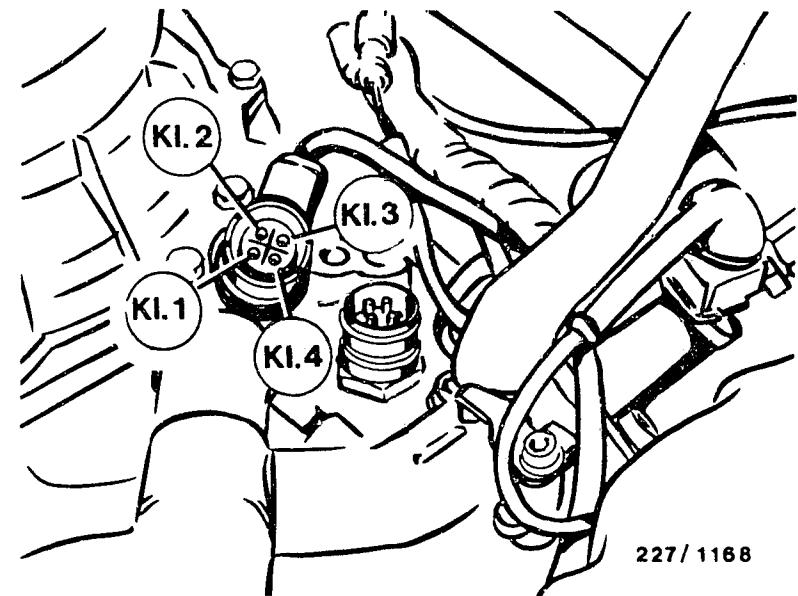
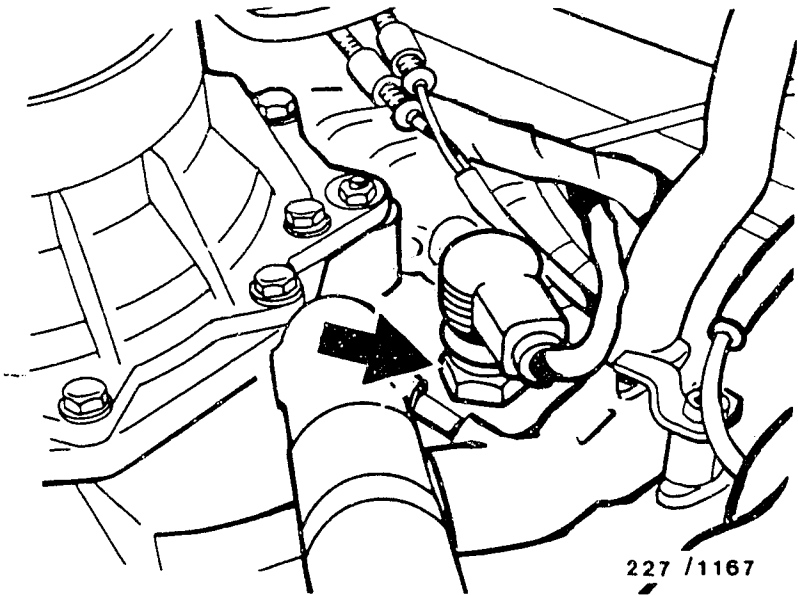
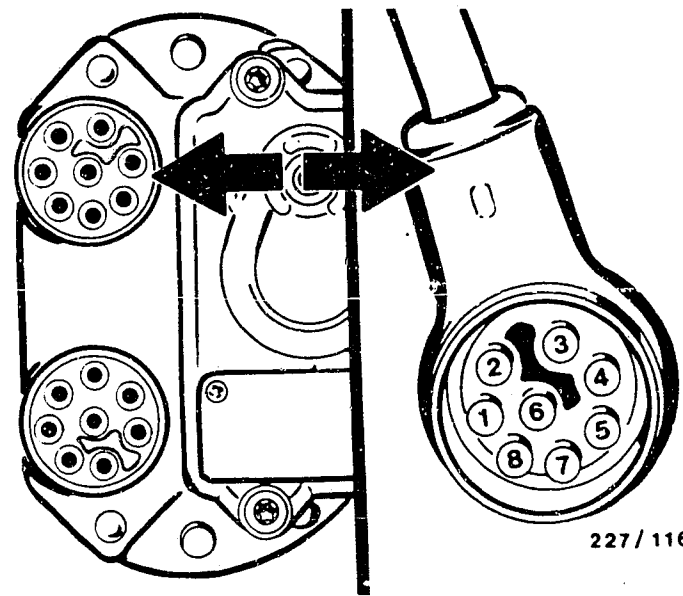
Ignition OFF. Eliminate fault.

Activation with subsequent fault elimination must be repeated until
flashing code 1 (no fault stored) is indicated.



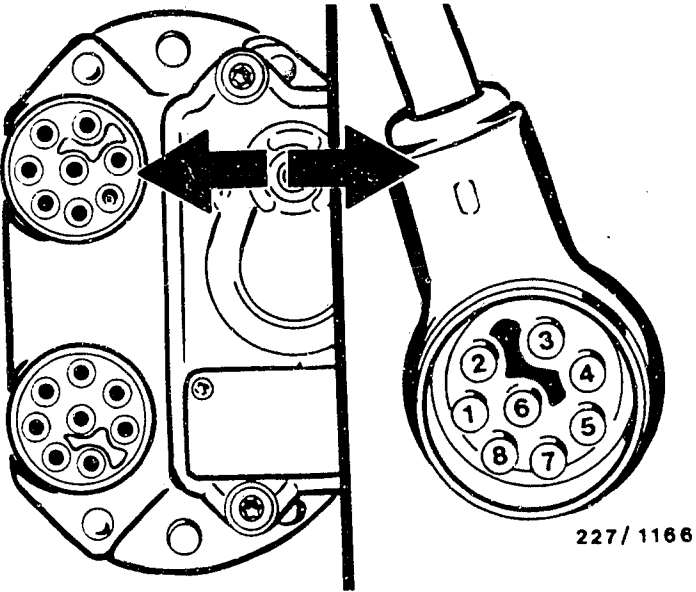
SELF-DIAGNOSIS TEST TABLE

Fault indication Flashing code	Testing of component/ function Test instructions/conditions	Termi- nals	Set values	Coor- dinate
1	NO FAULT STORED	—	—	—
2	MAX. RETARD (of at least 1 cylinder) AFTER-SALES SERVICE CANNOT TEST FLASHING CODE. Fuel with inadequate octane number, increased compression e.g. due to coke residues, abnormal engine noise (valves, camshaft, pistons, bearings).	—	—	—
3	TEMPERATURE SENSOR (COOLANT) Detach EI-K control-unit plug. See top picture, arrow. Detach temperature-sensor plug. See center picture, arrow. Resistance of EI-K control-unit plug and then of temperature- sensor plug. See top and bottom pictures. * = A reading of approx. 0 Ω (continuity) must be obtained with one of the 4 terminals. Note down the terminal with approx. 0 Ω Resistance of EI-K control-unit plug and diagonally of previously noted terminal (temperature- sensor plug). ** = or Continued on next picture page	<div>4</div> <div>1* 2* 3* 4*</div> <div>5</div> <div>1** 2** 3** 4</div>	<div>Approx. 0 Ω Approx. 0 Ω Approx. 0 Ω Approx. 0 Ω</div> <div>Approx. 0 Ω Approx. 0 Ω Approx. 0 Ω Approx. 0 Ω</div>	

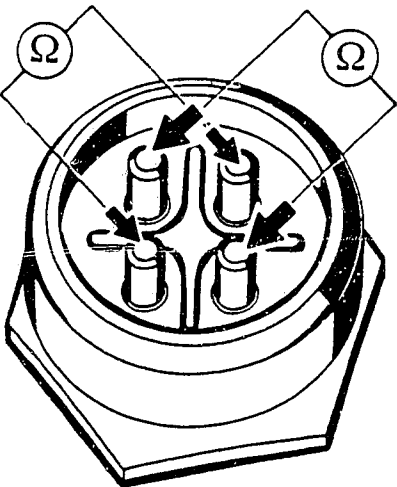


SELF-DIAGNOSIS TEST TABLE (CONTINUED)

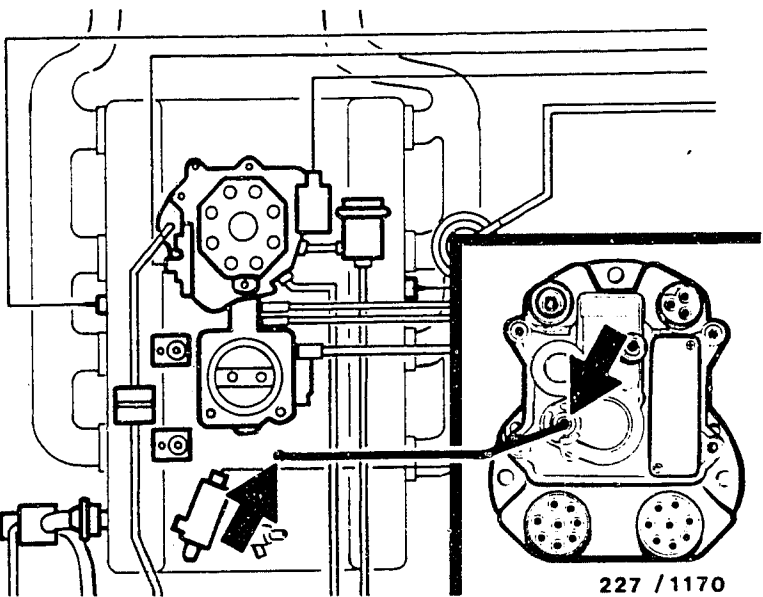
Fault indication Flashing code	Testing of component/ function Test instructions/conditions	Termi- nals	Set values	Coor- dinate
3	<p>TEMPERATURE SENSOR (COOLANT) (continued)</p> <p>Resistance, vehicle ground and EI-K control-unit plug. See top picture, arrow.</p> <p>Resistance, temperature sensor (coolant). * Note: Test both temperature sensors (diagonal measurement). See center picture.</p>	<p>B- 4 B- 5</p> <p>*</p>	<p>Infinity Ω Infinity Ω (Open-circuit)</p> <p>See brief instructions</p>	
4	<p>PRESSURE SENSOR</p> <p>Leak test on vacuum hose from EI-K control unit to throttle- valve-assembly plug connection. See bottom picture, arrow. If leak test O.K., renew EI-K control unit.</p>	—	—	
5	<p>KNOCK SENSORS</p> <p>Knock sensors defective. Knock-sensor tightening torque</p>	—	15...25 Nm	—



227 / 1166



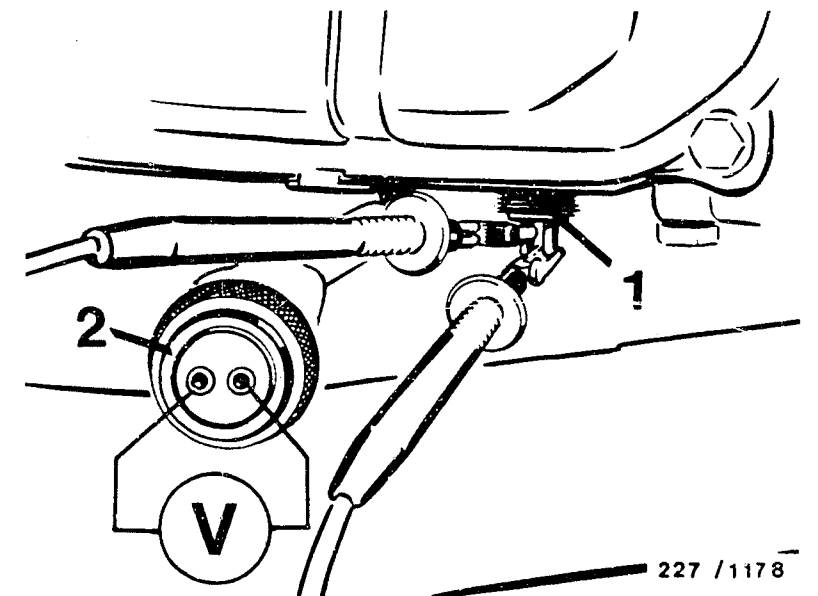
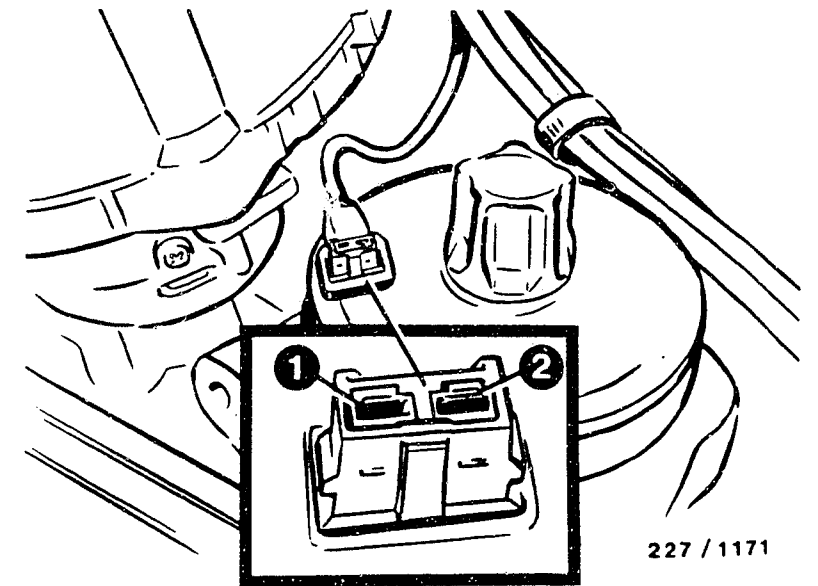
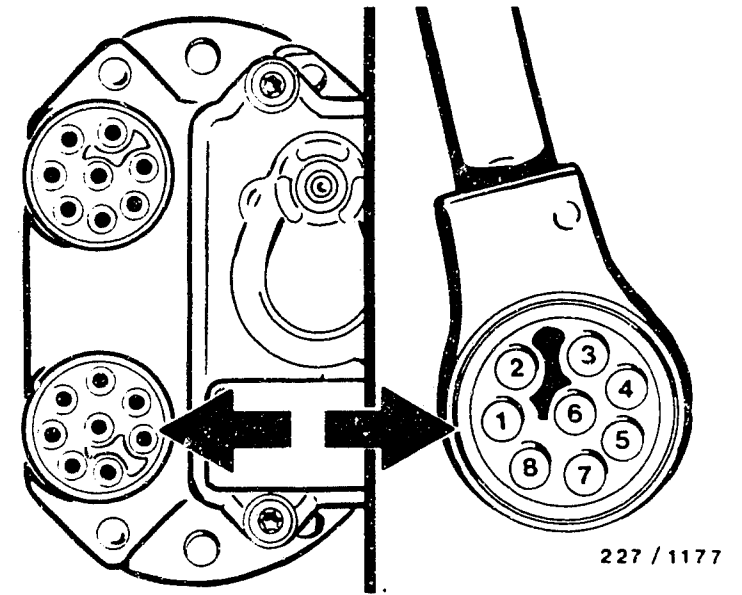
227 / 1169



227 / 1170

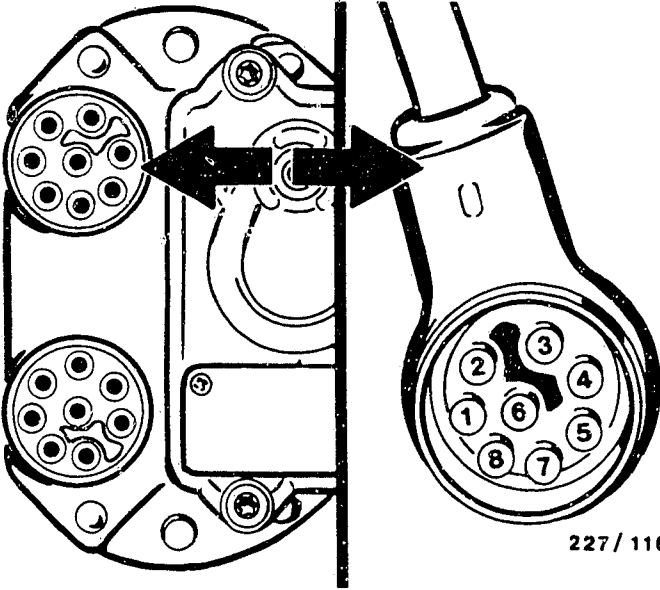
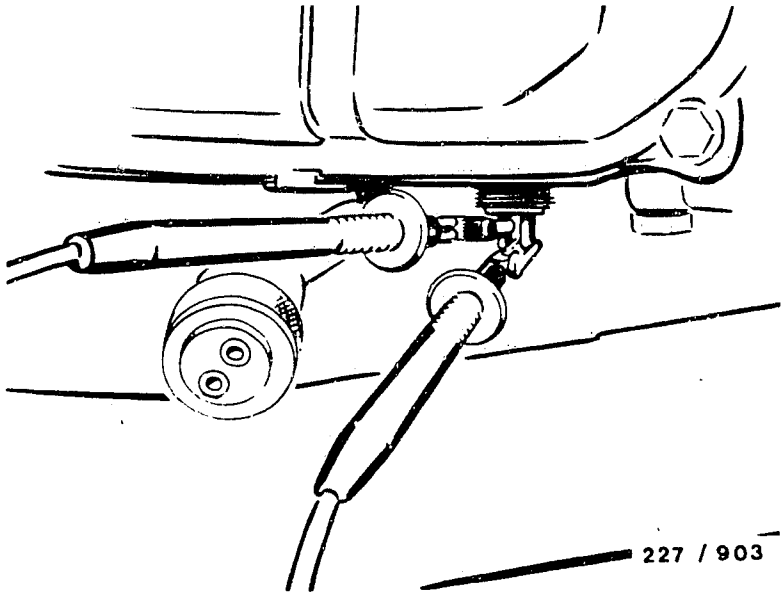
SELF-DIAGNOSIS TEST TABLE (CONTINUED)

Fault indication Flashing code	Testing of component/ function Test instructions/conditions	Termi- nals	Set values	Coor- dinate
6	<p>PULSE GENERATOR (CYLINDER RECOGNITION)</p> <p>Detach EI-K control-unit and ignition-distributor plugs. See top and center pictures. Resistance, EI-K control-unit and ignition-distributor plugs.</p> <p>Resistance, EI-K control-unit plug.</p> <p>Attach ignition-distributor plug. Resistance, EI-K control-unit plug.</p> <p>Resistance, EI-K control-unit plug and ignition-distributor housing (ground).</p>	<p>7 1</p> <p>5 2</p> <p>5 7</p> <p>5 7</p> <p>7 B-</p>	<p>Approx. 0 Ω (con-</p> <p>Approx. 0 Ω tinu-</p> <p>ity)</p> <p>Infinity Ω</p> <p>(open-circuit)</p> <p>See brief instruc-</p> <p>tions</p> <p>Infinity Ω</p> <p>(open-circuit)</p>	
7	<p>EI-K CONTROL UNIT (evaluation circuit)</p> <p>EI-K control unit defective.</p>	—	—	
8	<p>TRANSMISSION OVERLOAD PROTECTION SWITCH</p> <p>(Doesn't close)</p> <p>Resistance, transmission overload protection switch; see bottom picture, item 1. Engine idling. Actuate foot-operated parking brake. Pay attention to safety precautions (e.g. chocks at rear wheels).</p> <p>Selector lever in:</p> <p>Position "N" or "P"</p> <p>Position "D"</p> <p>Voltage, coupling, transmission overload protection switch. See bottom picture, item 2</p> <p>Ignition ON.</p>	<p>—</p> <p>—</p> <p>—</p>	<p>Greater than 20</p> <p>k Ω (open circuit)</p> <p>Less than 1 Ω</p> <p>(continuity)</p> <p>Approx. 10 V</p>	



SELF-DIAGNOSIS TEST TABLE (CONTINUED)

Fault indication Flashing code	Testing of component/ function Test instructions/conditions	Termi- nals	Set values	Coor- dinate
9	<p>TRANSMISSION OVERLOAD PROTECTION SWITCH (Doesn't open)</p> <p>Resistance, transmission overload protection switch. See top picture. Engine idling. Actuate foot-operated parking brake.</p> <p>Pay attention to safety regulations (e.g. chocks at rear wheels). Selector lever in: Position " N " or " P " Position " D "</p> <p>Detach EI-K control-unit plug. See bottom picture. Coupling, transmission overload protection switch detached.</p> <p>Resistance, EI-K control unit and vehicle ground.</p>	<p>—</p> <p>—</p> <p>1 B-</p>	<p>Greater than 20 k Ω (open circuit) Less than 1 Ω (continuity)</p> <p>Infinity Ω (open-circuit)</p>	



SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (1)

Flashing code 3

Test temperature sensor (coolant).

Detach EI-K control-unit plug (top picture) and temperature-sensor plug (center picture).

Connect ohmmeter to term. 4 of EI-K control-unit plug and consecutively to term. 1 - term. 4 (bottom picture) of temperature-sensor plug.

One of the 4 terminals must have continuity.

Set value: approx. 0 Ω
(continuity)

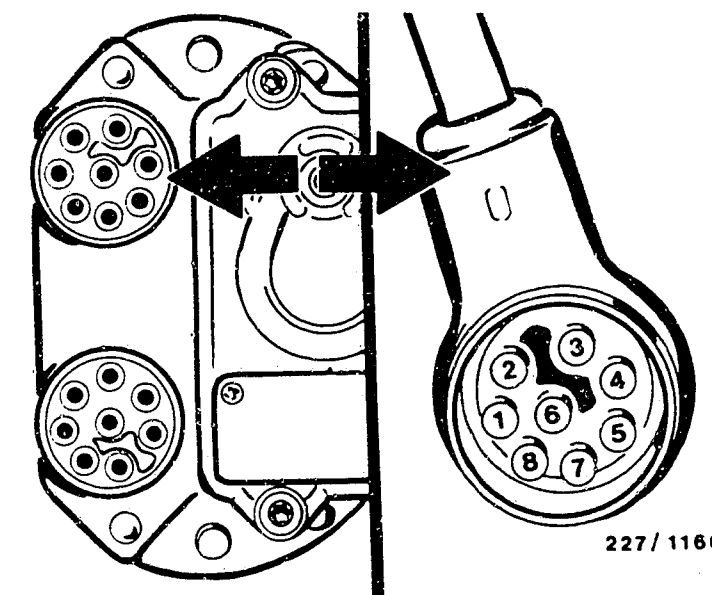
Note down the terminal with approx. 0 Ω . Connect terminal (temperature-sensor plug) located diagonally from above terminal and term. 5 of EI-K control-unit plug to ohmmeter.

Set value: approx. 0 Ω
(continuity)

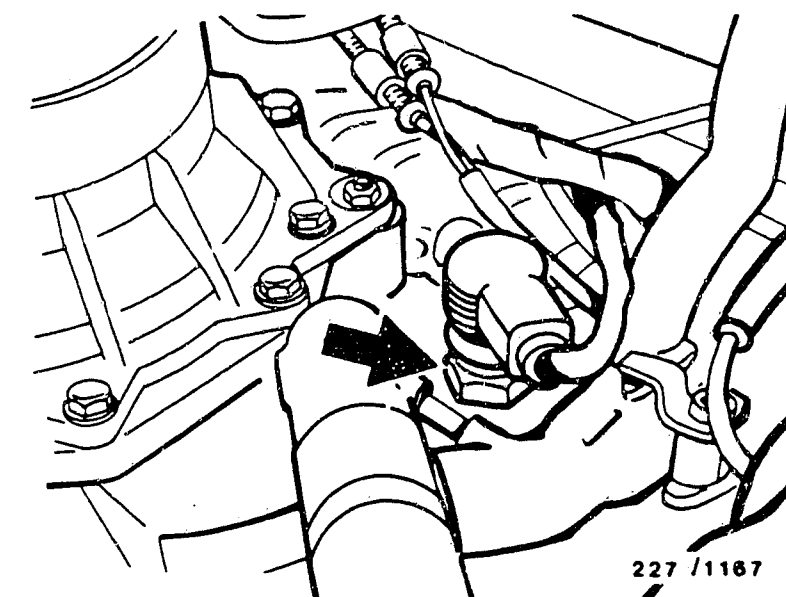
Is set value attained?

N>

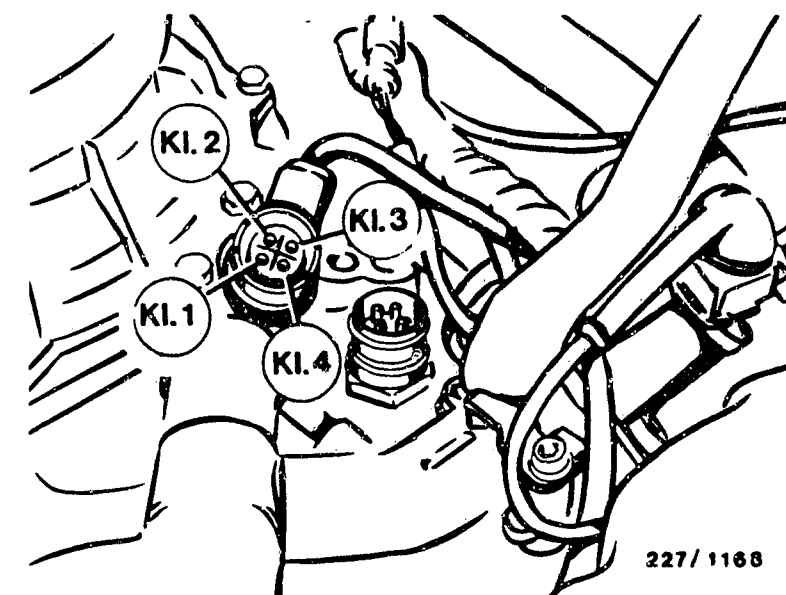
Eliminate open-circuit.



227/1166



227/1167



227/1168

Continued on next picture page

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (1) CONTINUED (1)

Connect ohmmeter to vehicle ground
and consecutively to term. 4 and
term. 5 of EI-K control-unit plug.
See top picture.

Set value: infinity Ω
(open-circuit)

Is set value attained?

N>

Eliminate short-circuit to ground.

Y

Connect ohmmeter to temperature
sensor (coolant).
See bottom picture.
Test both temperature sensors
(diagonal measurement).
See bottom picture.

Set value: see brief instructions

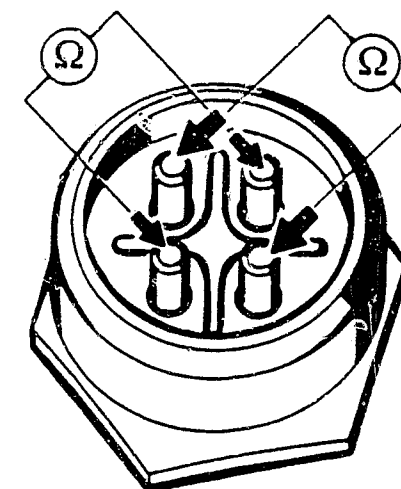
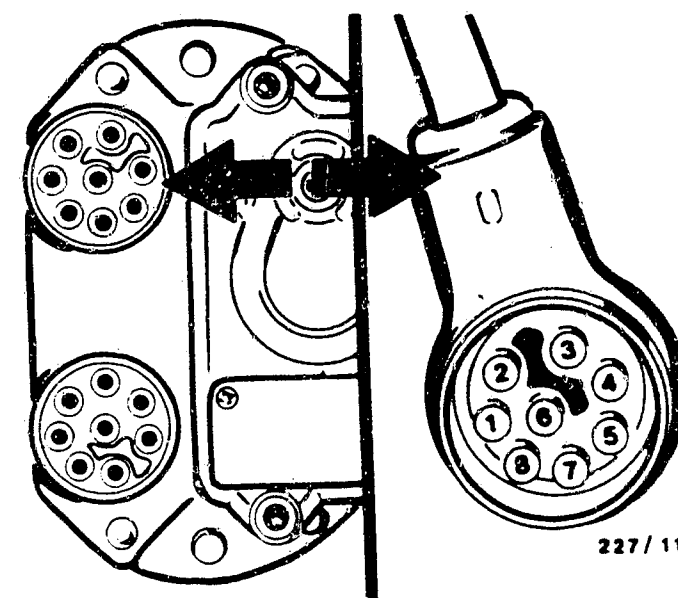
Is set value attained?

N>

Renew temperature sensor (coolant).

Y

Return to self-diagnosis
test table B17



SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (2)

Flashing code 4

Test pressure sensor.

Check vacuum hose from EI-K control unit to throttle-valve-assembly plug connection for leaks.
See picture, arrow.

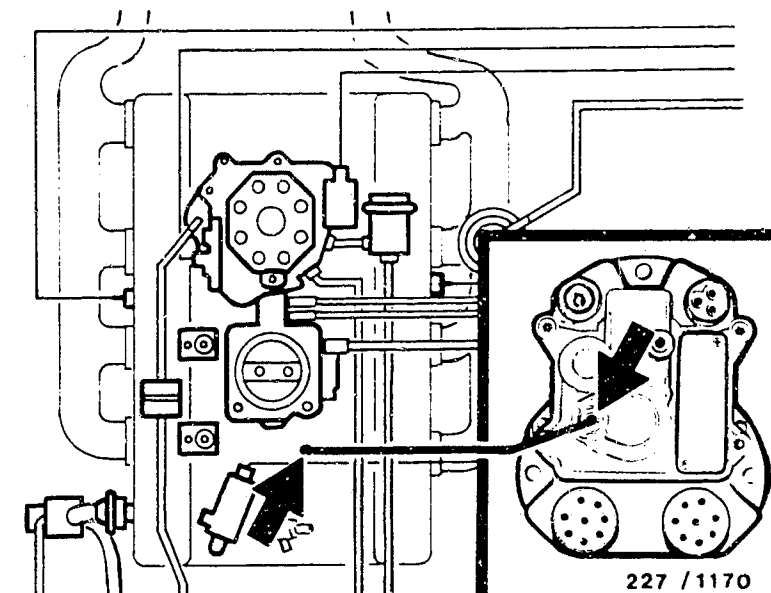
No leakage?

N>

Eliminate leak.

Renew EI-K control unit.

Return to self-diagnosis
test table B19



SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (3)

Flashing code 6

Test pulse generator (cylinder recognition).

Detach EI-K control-unit and ignition-distributor plugs.
See top and bottom pictures.

Connect ohmmeter to:

EI-K control-	Ignition-
unit plug	distributor plug

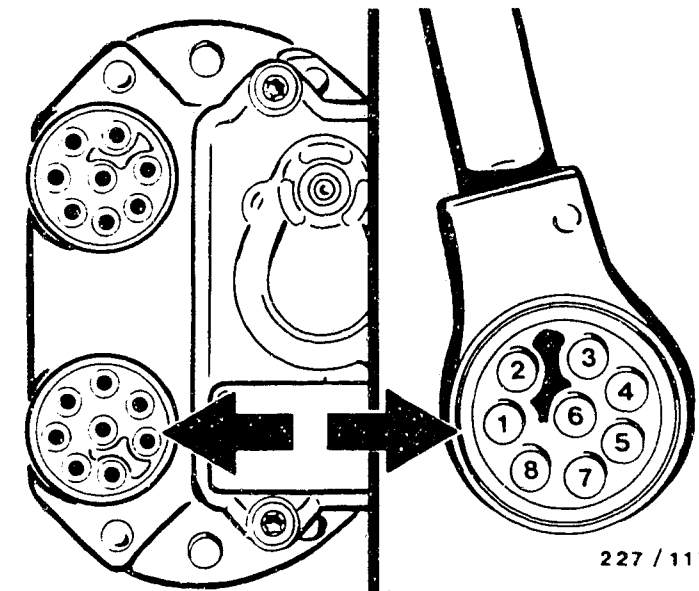
Term. 7	Term. 1
Term. 5	Term. 2

Set value: approx. 0 Ω
(continuity)

Is set value attained?

N>

Eliminate open-circuit.



227 / 1177

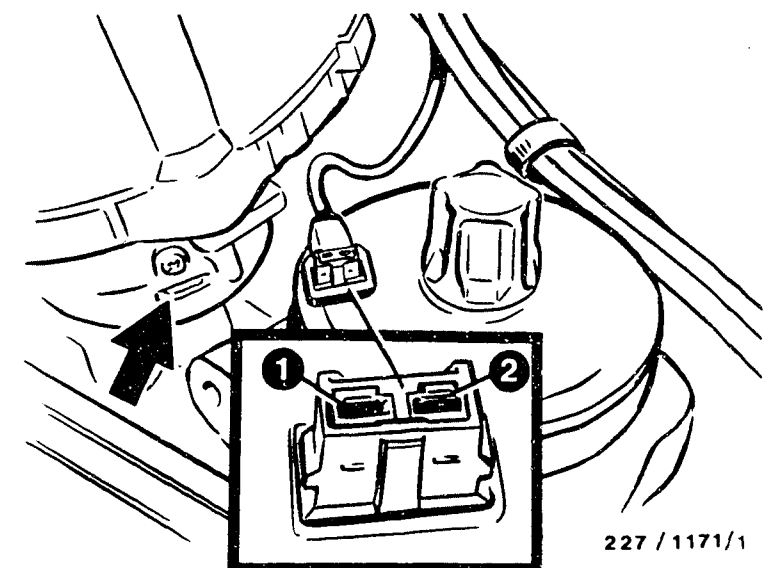
Connect ohmmeter to term. 5 and term. 7 of EI-K control-unit plug.

Set value: infinity Ω
(open-circuit)

Is set value attained?

N>

If ohmmeter gives a reading of approx. 0 Ω (continuity), check lead from term. 7 of EI-K control-unit plug to term. 1 of ignition-distributor plug for short-circuit to ground.
Eliminate short-circuit to ground.



227 / 1171/1

Continued on next picture page

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (3) CONTINUED (1)

Attach ignition-distributor plug.
See top picture.

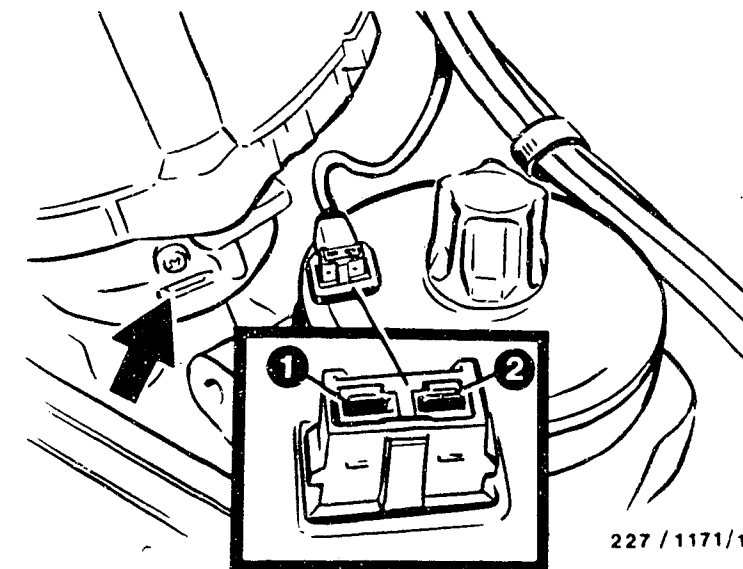
Connect ohmmeter to term. 5 and
term. 7 of EI-K control-unit plug.
See bottom picture.

Set value: see brief instructions

Is set value attained?

N>

Renew pulse generator (cylinder
recognition) and/or ignition
distributor.



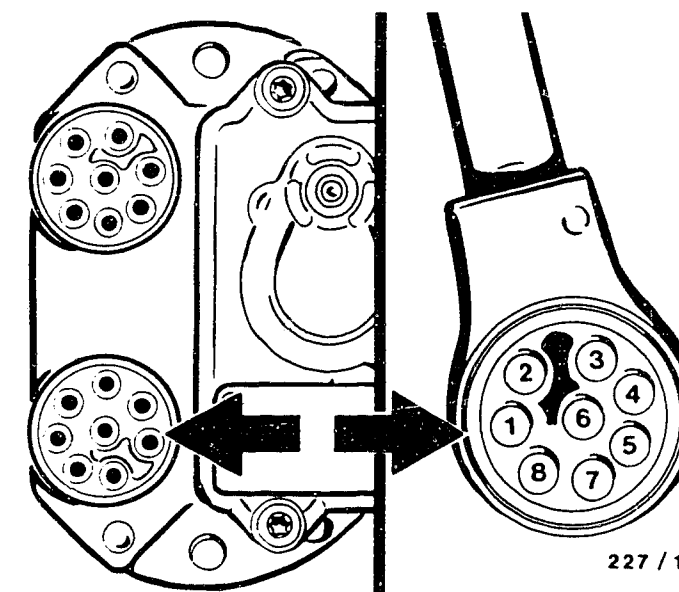
Connect ohmmeter to term. 7 of EI-K
control-unit plug and ignition-
distributor housing (ground).
See bottom picture.

Set value: infinity Ω
(open-circuit)

Is set value attained?

N>

Renew pulse generator (cylinder
recognition) and/or ignition
distributor.



Return to self-diagnosis
test table B21

Flashing code 8

Transmission overload protection switch doesn't close.

Loosen union nut at transmission overload protection switch and detach coupling.
See top picture, arrow.

Connect ohmmeter to transmission overload protection switch.
See bottom picture.

Allow engine to idle.

Actuate foot-operated parking brake.

I m p o r t a n t :
Pay attention to safety regulations when performing next test (e.g. chocks at rear wheel).

See table for set values in selector lever setting:

Position	Resistance
"N" or "P"	= > 20 k Ω (open-circuit)
"D"	= < 1 Ω (continuity)

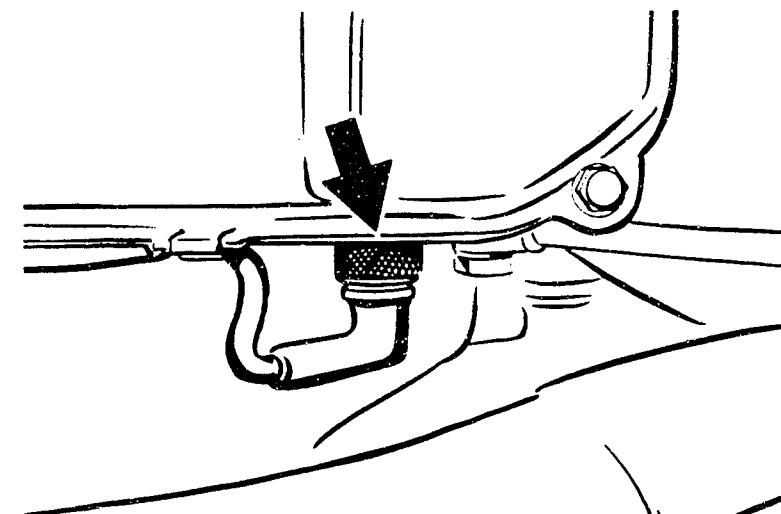
Is set value attained?

N>

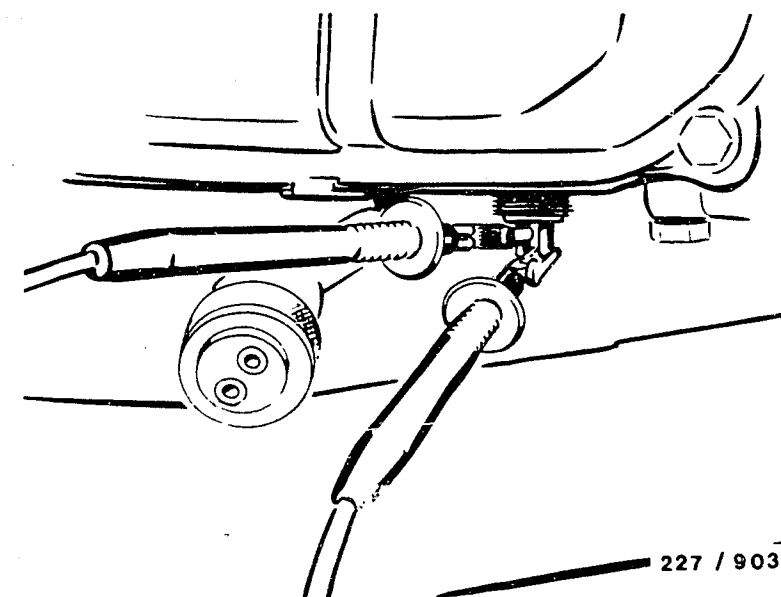
Renew transmission overload protection switch.

Repeat test.

If set value is still not attained, repair transmission (DB Agent).



227 / 902



227 / 903

Continued on next picture page

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (4) CONTINUED (1)

Switch off ignition.

EI-K control-unit plug is connected.

Connect voltmeter to detached coupling of transmission overload protection switch.
See picture.

Switch on ignition.

Set value: approx. 10 V

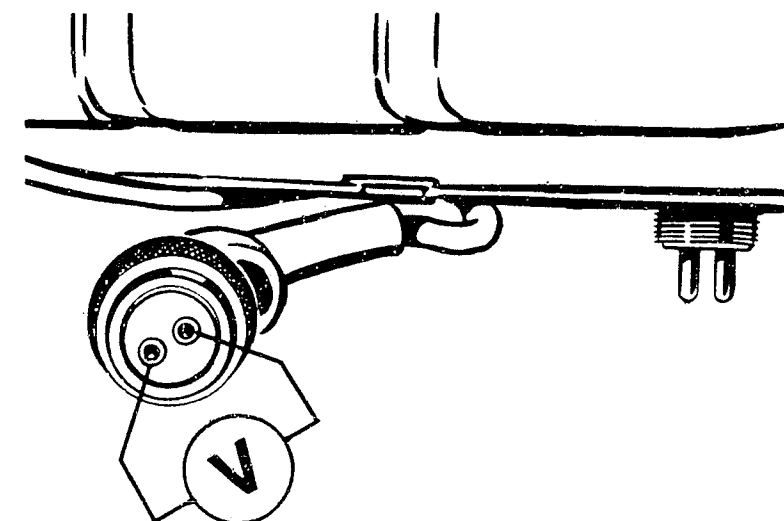
Is set value attained?

N>

Check connection for open circuit on positive and negative sides.

Eliminate open circuit.

If there was no open circuit, replace EI-K control unit.



227 / 904

Return to self-diagnosis
test table B21

C09

<=>

C10

<=>

V~

Flashing code 9

Transmission overload protection switch doesn't open.

Loosen union nut at transmission overload protection switch and detach coupling.
See top picture, arrow.

Connect ohmmeter to transmission overload protection switch.
See bottom picture.

Allow engine to idle.

Actuate foot-operated parking brake.

I m p o r t a n t :
Pay attention to safety regulations (e.g. chocks at rear wheels) when performing next test.

See table for set values in selector lever position:

Position	Resistance
"N" or "P"	$> 20 \text{ k } \Omega$ (open-circuit)
"D"	$= < 1 \text{ } \blacksquare \Omega$ (continuity)

Is set value attained?

Y

V

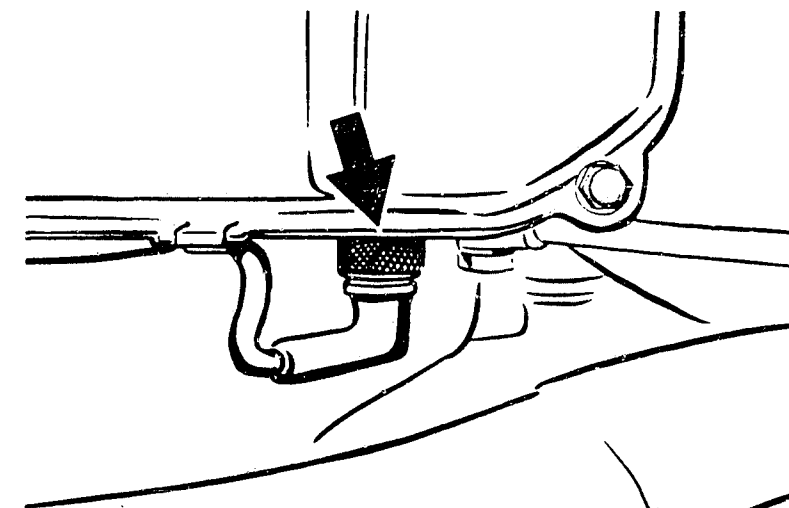
Continued on next picture page

N>

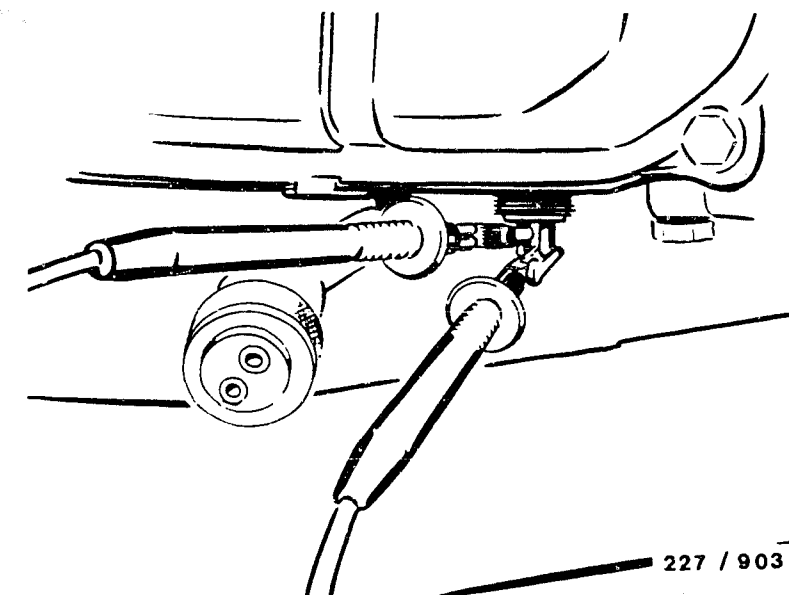
Renew transmission overload protection switch.

Repeat test.

If set value is still not attained, repair transmission (DB Agent).



227 / 902



227 / 903

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (5) CONTINUED (1)

Switch off ignition.

Detach EI-K control-unit plug.
See top picture, arrow.

Loosen union nut at transmission
overload protection switch and
detach coupling.
See bottom picture, arrow.

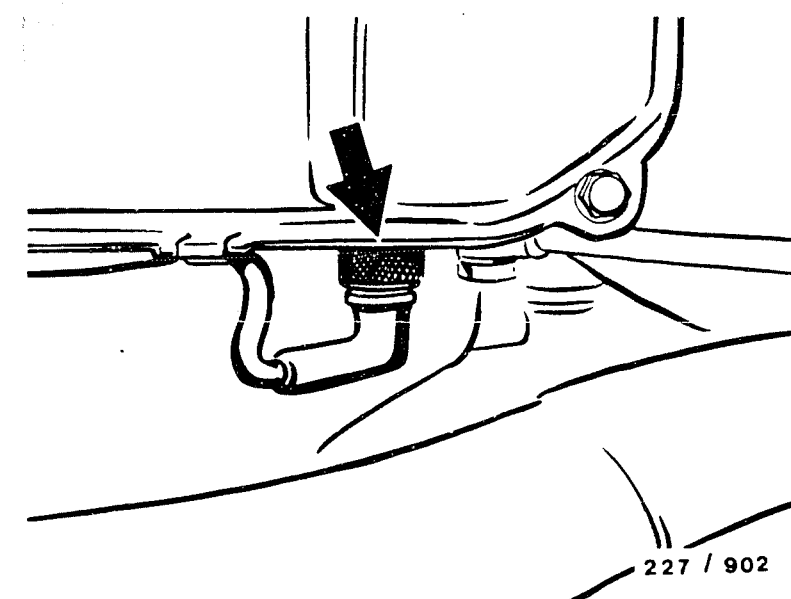
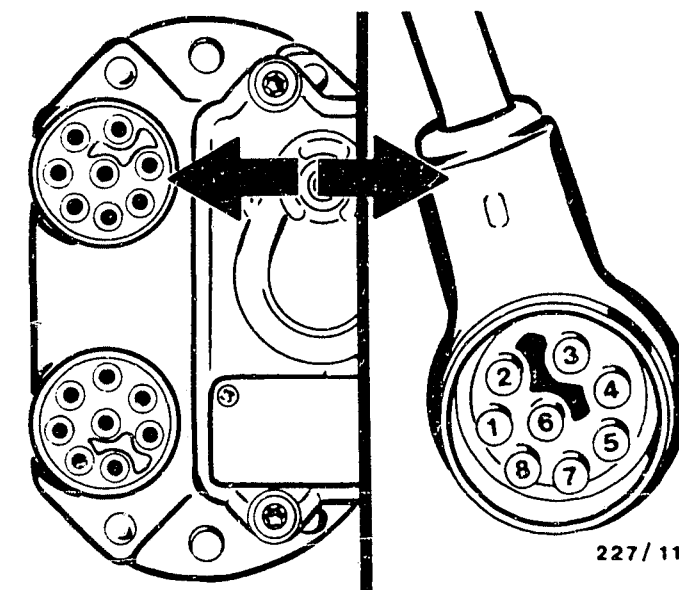
Connect ohmmeter to term. 1 of EI-K
control-unit plug and vehicle
ground.
See top picture.

Set value: infinity Ω
(open-circuit)

Is set value attained?

N>

Check lead for short-circuit to
ground.
Eliminate short-circuit to ground.



Return to self-diagnosis
test table B23

C13

<=>

C14

<=>

TROUBLE-SHOOTING PROGRAM (1)



Test high-voltage side.

Test spark plugs, spark-plug connectors, suppression resistors, H.T. ignition cables, distributor cap, distributor rotor etc. for proper operation (e.g. open circuit, shunt).

Assessment e.g. through ignition oscillogram, resistance measurements and visual check.

High-voltage side O.K.?

N>

Repair high-voltage side.



Return to trouble-shooting chart B04

TROUBLE-SHOOTING PROGRAM (2)

V

Test ignition coil.

Remove protective cap from ignition coil.

Ignition coil, primary, term. 15 and term. 1
(Take account of resistance of test lead/test prods)

Set value: see brief instructions

Ignition coil, secondary, term. 1 and term. 4

Set value: see brief instructions

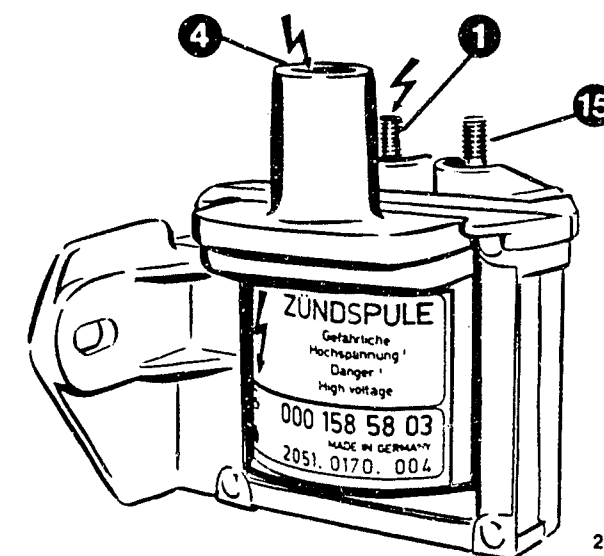
Is set value attained?

N>

Renew ignition coil.

V

Return to trouble-shooting chart B04



227 / 896

High-tension arrows:
Caution, 400 V...25 kV

Test ignition-distributor setting
(high-tension side).

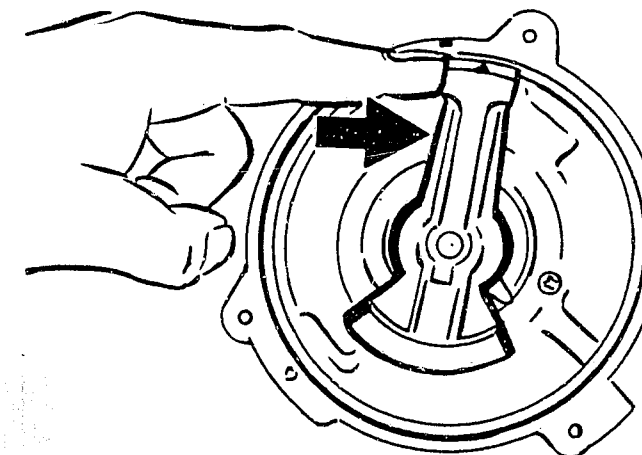
Remove ignition-distributor cover,
protective cap, distributor cap
and dust cover. Attach distributor
rotor.

Turn distributor rotor by hand in
a clockwise direction as far as it
will go. See top picture.

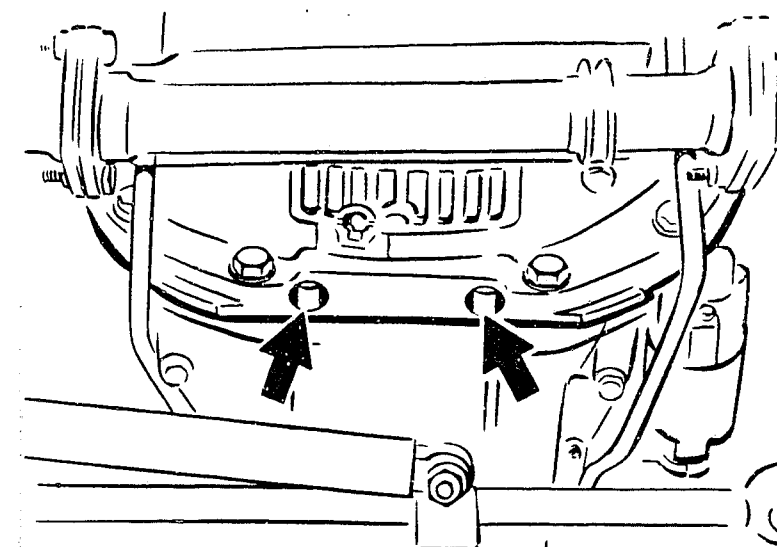
In doing so, test driver of
distributor rotor/flyweights for
freedom of movement.
Distributor rotor must return to
stop again after being released.

Use screwdriver to set engine
cyl. 1 to TDC by way of starting-
motor ring gear (opening in trans-
mission cover - center picture).
See bottom picture.

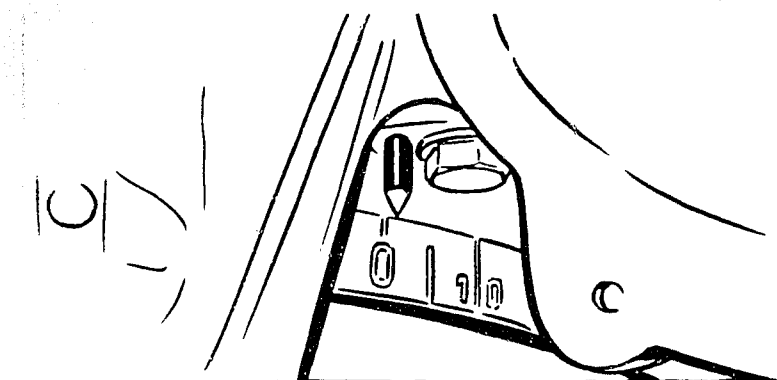
TDC setting must be carried out
with extreme accuracy and there
must not be any play.
No play in the TDC setting
(crankshaft, timing chain etc.) is
ensured if the motor is turned in
the DIRECTION OF ROTATION
(to the left in direction of
travel).



227 / 1191



227 / 898



227 / 899

Continued on next picture page

TROUBLE-SHOOTING PROGRAM (3) CONTINUED (1)

Position self-produced auxiliary tool on ignition-distributor housing such that its edge is in alignment with the distributor-housing notch.
See top picture, arrow.

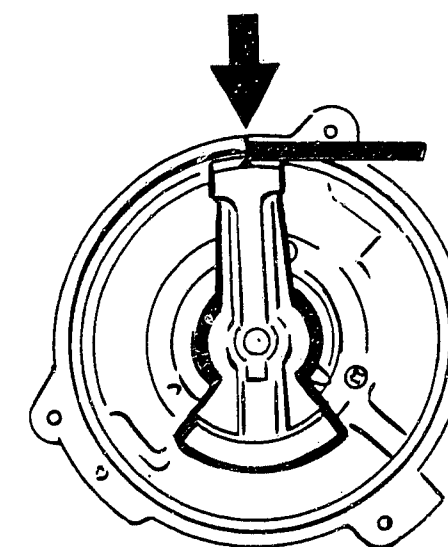
Tilt auxiliary tool towards center of distributor.
Press distributor rotor by hand against direction of rotation.
See bottom picture, arrow.

Distributor-rotor notch must be in alignment with front edge of auxiliary tool.

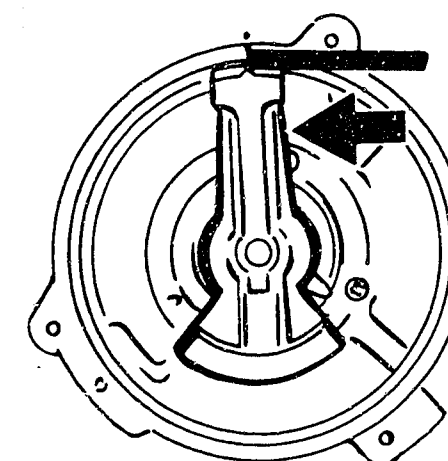
Ignition-distributor setting O.K.?

N>

Test ignition distributor.



227 / 1192



227 / 1172

Return to trouble-shooting chart B04

TROUBLE-SHOOTING PROGRAM (4)

Test EI-K control-unit voltage.

Detach EI-K control-unit plug and connect voltmeter to term. 6 (+) and term. 2 (-).
See picture, arrow.

Switch on ignition.

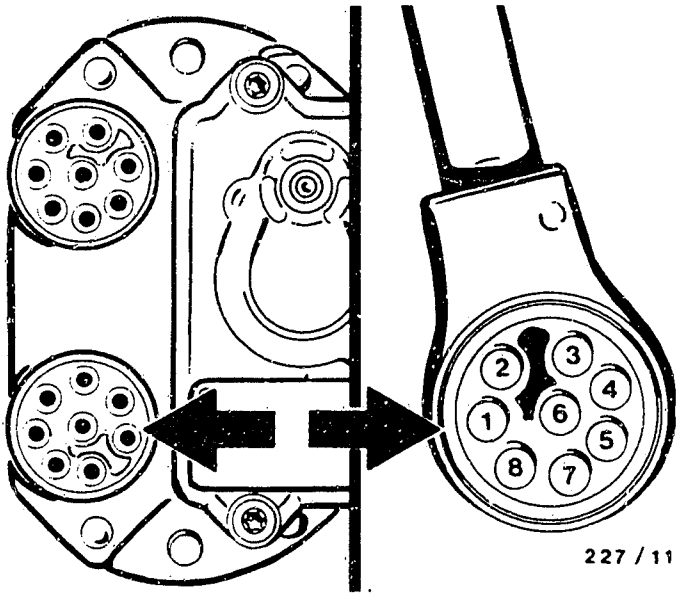
Set value: battery voltage

Is set value attained?

N>

Check leads and connections from ignition and starting switch to term. 6 of EI-K control-unit plug including ground lead, term. 2 for open-circuit.

Eliminate open-circuit.



Return to trouble-shooting chart B04

TROUBLE-SHOOTING PROGRAM (5)

Test primary-circuit voltage.

Detach EI-K control-unit plug and connect voltmeter to term. 1 (+) and term. 2 (-).
See picture, arrow.

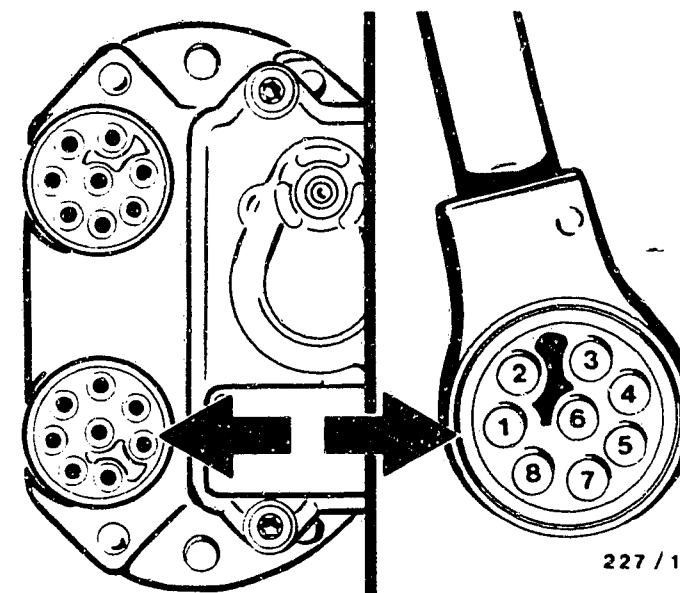
Switch on ignition.

Set value: battery voltage

Is set value attained?

N>

Test lead from ignition and starting switch to term. 15 of ignition coil, primary winding of ignition coil and lead from term. 1 of ignition coil to term. 1 of EI-K control-unit plug including term. 2 of ground lead for open-circuit. Eliminate open-circuit.



Return to trouble-shooting chart B04

C25

<=>

C26

<=>

TROUBLE-SHOOTING PROGRAM (6)

Test pulse-generator insulation.

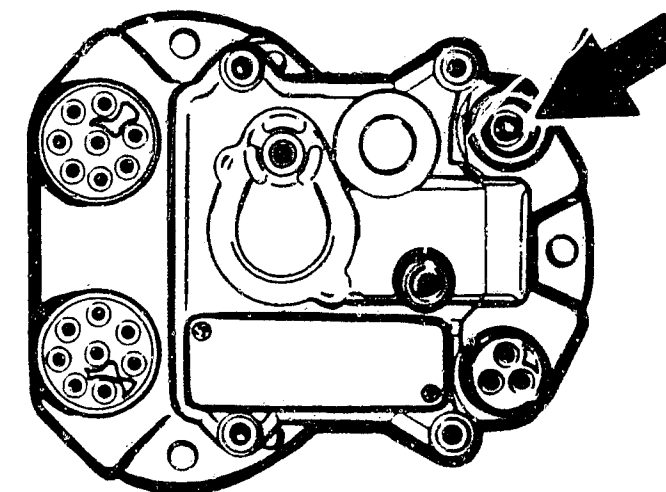
Detach EI-K control-unit plug and connect ohmmeter to term. 7 and vehicle ground.
See top picture, arrow or center picture.

Set value: infinity Ω

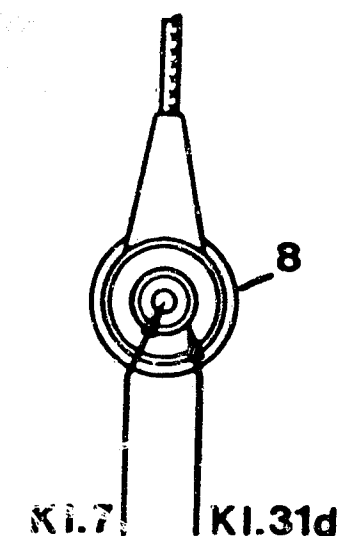
Is set value attained?

N>

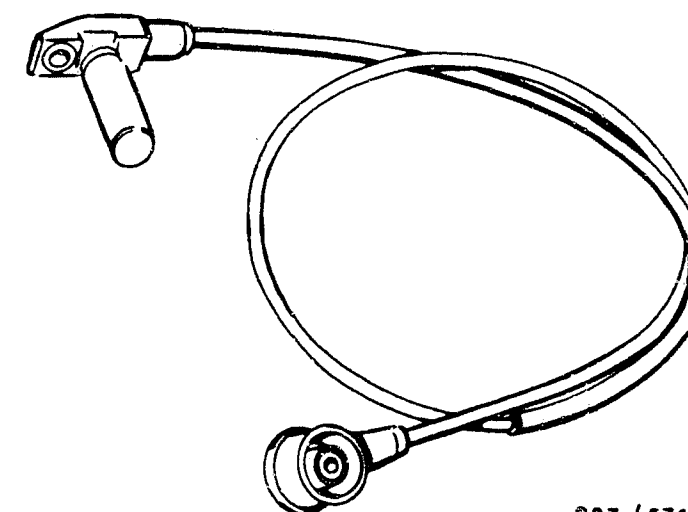
Renew pulse generator.
See bottom picture.



227 / 1193



227 / 156



227 / 574

Return to trouble-shooting chart
B04

C27

<=>

C28

<=>

TROUBLE-SHOOTING PROGRAM (7)

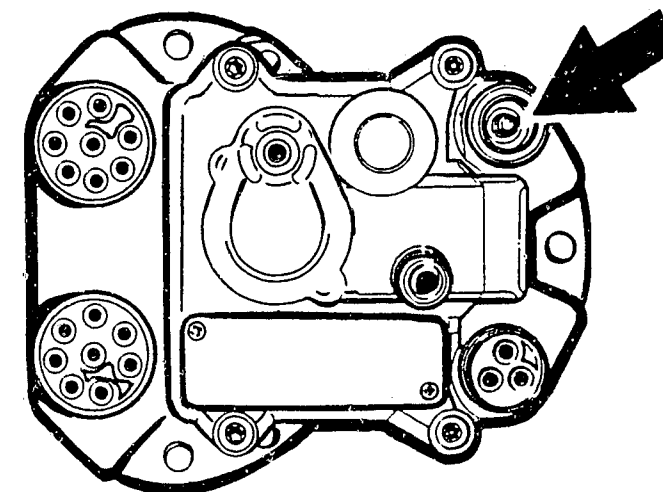
Test pulse-generator internal resistance.

Detach EI-K control-unit plug and connect ohmmeter to term. 7 and term. 31d.
See top picture, arrow or center picture.

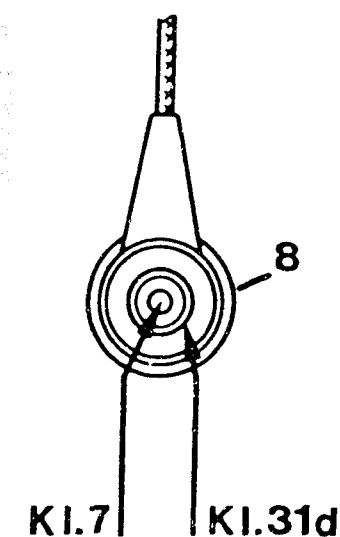
Set value: see brief instructions

Is set value attained?

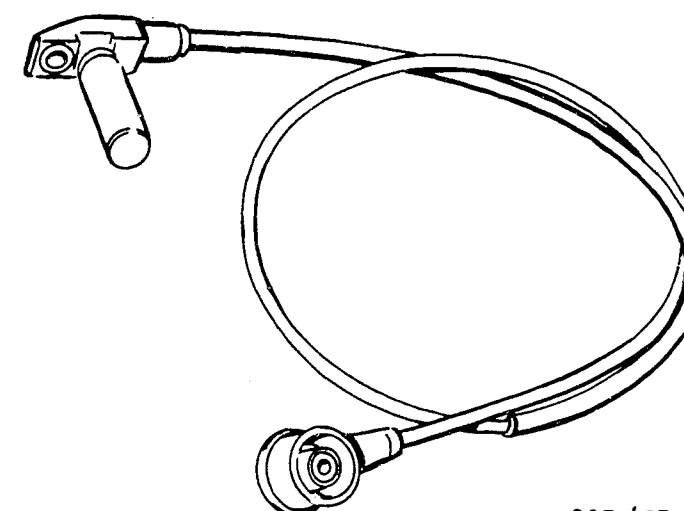
Renew pulse generator.
See bottom picture.



227 / 1193



227 / 156



227 / 574

Return to trouble-shooting chart
B04

D01

<=>

D02

<=>

TROUBLE-SHOOTING PROGRAM (8)

Test pulse-generator voltage.

Detach EI-K control-unit plug.

Connect oscilloscope in program selector switch setting "special" in accordance with operating instructions.

For example MOT 206:

Connect red and black terminals to EI-K control-unit plug, term. 7 (+) and term. 31d (-). See top picture.

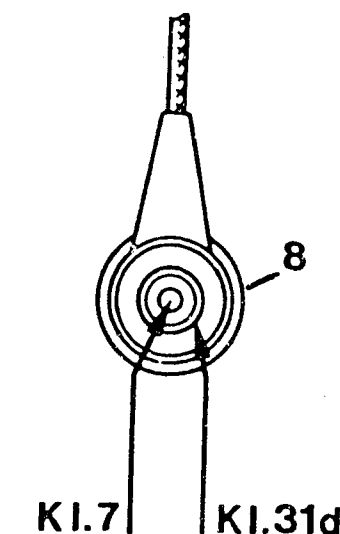
Start engine.
Oscilloscope must indicate voltage.

Set value: equal to/greater than 1.0 V
See center picture.

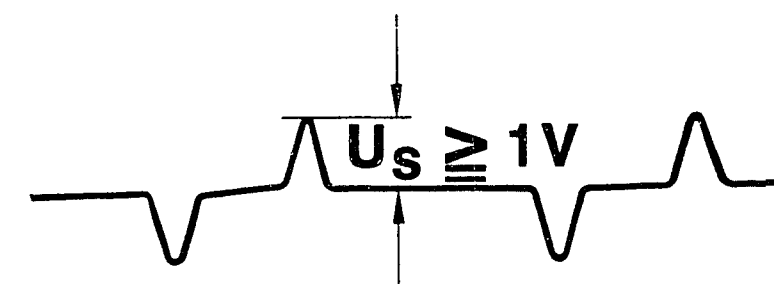
Is set value attained?

N>

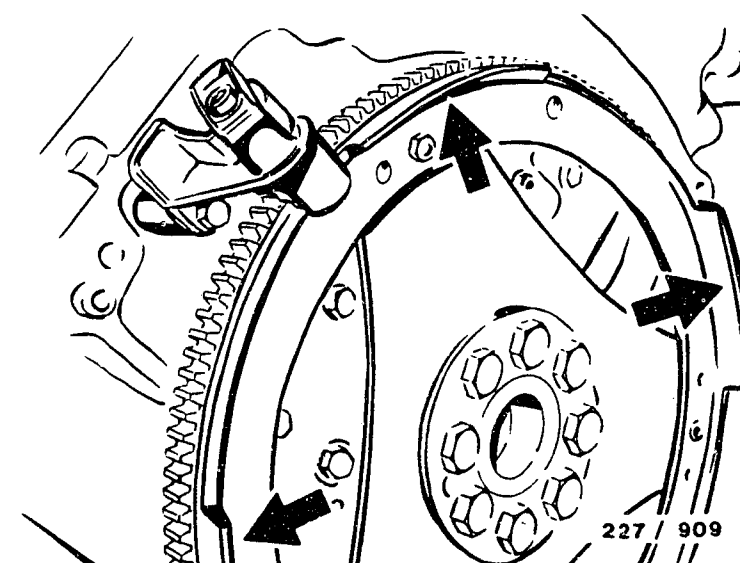
Remove pulse generator and examine it for mechanical damage.
Crank engine via starting-motor ring gear (opening in transmission cover) with screwdriver and at the same time check the 4 segments at the driver disc for mechanical damage by way of the pulse-generator bore.
See bottom picture, arrow.
Replace mechanically defective parts.
If pulse generator and segments were in proper mechanical working order, renew pulse generator (electrical fault).



227/156



227/805



227/909

Return to trouble-shooting chart B04

D03

<=>

D04

<=>

TROUBLE-SHOOTING PROGRAM (9)

Test contact resistances (primary side).

Disconnect battery negative and positive leads.
Detach EI-K control-unit plug.
See top picture.

Switch on ignition.

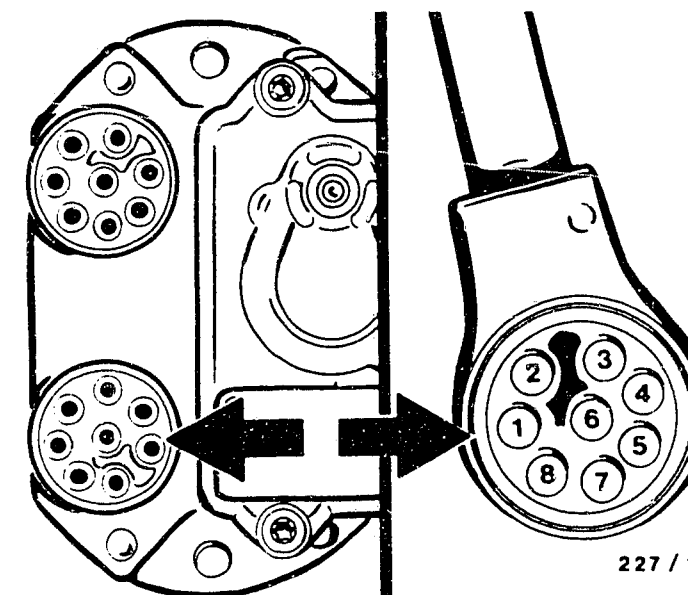
Test leads from battery positive terminal to term. 6 of EI-K control-unit plug including leads from battery negative terminal to term. 2 of EI-K control-unit plug for contact resistance.
See top picture.
(Take account of resistance of test leads/test prods).

Set value: see brief instructions

Is set value attained?

N>

Eliminate contact resistance.



227 / 1177

Test leads from battery positive terminal to term. 15 of ignition coil as well as lead from term. 1 of ignition coil to term. 1 of EI-K control-unit plug for contact resistance.
See top picture.
(Take into account resistance of test lead/test prods).

Set value: see brief instructions

Is set value attained?

N>

Eliminate contact resistance.

Return to trouble-shooting chart B04

D05

<=>

D06

<=>

TROUBLE-SHOOTING PROGRAM (10)

V

Test primary signal.

EI-K control-unit plugs are attached.

Primary signal with oscilloscope

Connect oscilloscope in accordance with operating instructions to term. 15 (+) and term. 1 (-) of ignition coil.

Start engine.

Set value:

Oscilloscope must indicate primary voltage (magnitude irrelevant).
See picture.

O R

Primary signal with engine-speed tester

Connect engine-speed tester in accordance with operating instructions to term. 15 (+) and term. 1 (-) of ignition coil.

Start engine.

Set value:

Engine-speed tester must indicate a value irrespective of the magnitude.

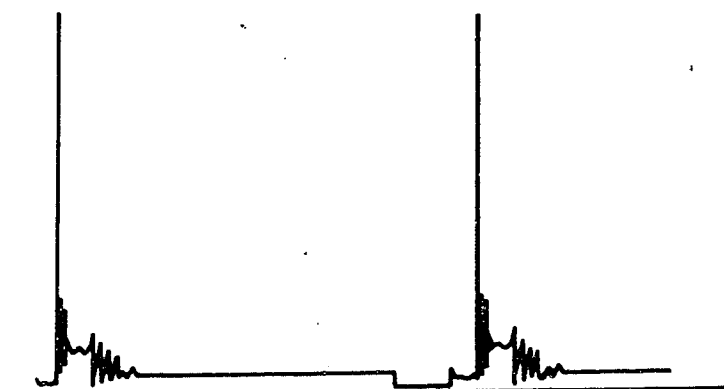
Primary signal present?

Y
V

Return to trouble-shooting chart
B04

N>

Renew EI-K control unit.



227/1100

D07

<==>

D08

<==>

TROUBLE-SHOOTING PROGRAM (11)

V

Test peak-coil-current cutoff.

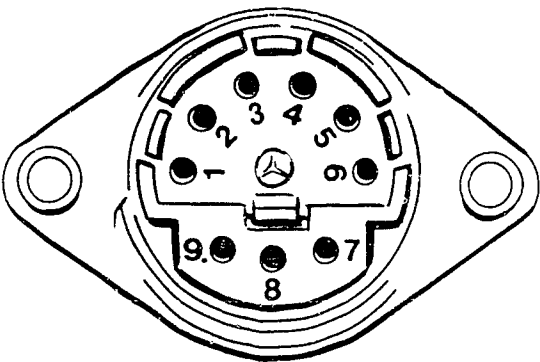
Connect voltmeter with test prods to term. 5 (+) and term. 4 (-) of diagnosis socket.
See picture.
Switch on ignition.

Set value: voltmeter may briefly deflect for approx. 1 s.
Voltmeter must return to 0 V.

Is set value attained?

N>

Renew EI control unit and ignition coil.



227 / 926

Y

V

Return to trouble-shooting chart B04

TROUBLE-SHOOTING PROGRAM (12)

V

Test voltage of EI-K control unit,
ignition coil.

N>

Connect voltmeter with test prod
to term. 5 (+) of diagnosis socket
and battery terminal (-).
See picture.
Allow engine to idle.

Set value: 12...14 V or max. 1 V
below battery voltage.

Is set value attained?

Y

V

Return to trouble-shooting chart
B04

Disconnect positive lead from
battery.

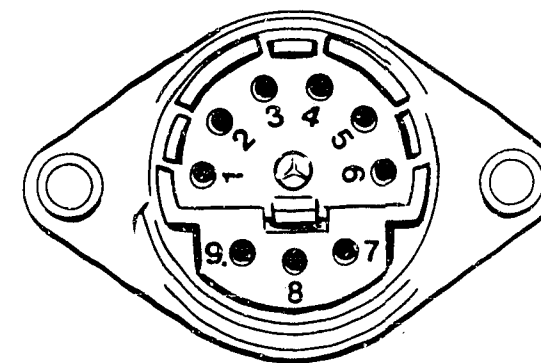
Switch on ignition.

Check for contact resistance
in leads from positive battery
terminal to ignition coil term. 15.

Set value: max. 0,3 Ω

(Take resistance of test lead
and test prods into
account.)

Eliminate contact resistance



227 / 926

TROUBLE-SHOOTING PROGRAM (13)

V

Test primary voltage.
(Insofar as MOT series present)

N>

Renew EI-K control unit.

Remove protective cap from ignition coil.

Connect oscilloscope (e.g. MOT 206) together with pulse-shaping circuit 1 684 463 154 to ignition coil in accordance with operating instructions.

N o t e :

Incorrect measured value without pulse-shaping circuit.

Allow engine to idle.

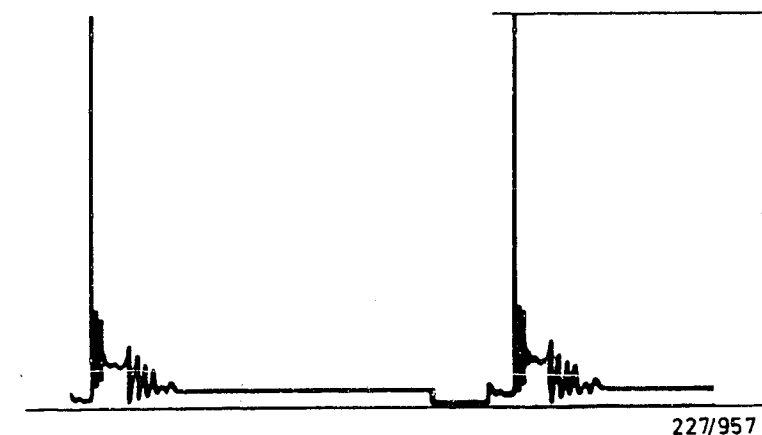
Set value: see picture or brief instructions

Is set value attained?

Y

V

Return to trouble-shooting chart 804



* = See brief instructions

TROUBLE-SHOOTING PROGRAM (14)

Test ignition angle.

Connect motortester with adapter lead to diagnosis socket.

Vacuum hose is connected to EI-K control unit.

Engine is at operating temperature, however $< 95^{\circ} \text{C}$.

Allow engine to idle
(650...750 min⁻¹)

Set value: see brief instructions

Is set value attained?

N>

Detach trimming coupling at EI-K control unit and connect ohmmeter. See picture.

Set value: CAT trimming coupling
(DB No. 015 545 66 28)
infinity Ω .

Set value: retrofit trimming coupling (DB No. 015 545 72 28)
0 Ω .

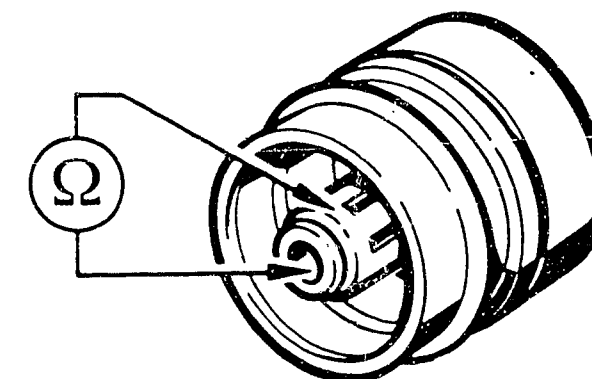
Renew EI-K control unit if set value is attained.

N o t e :

A trimming coupling is attached to the EI-K control unit for activating the retrofit/CAT ignition map.

Retrofit trimming coupling (0 Ω) for operation without lambda closed-loop control.

CAT trimming coupling (infinity Ω) for operation with lambda closed-loop control.



2 27/1194

Return to trouble-shooting chart
B04

D15

<=>

D16

<=>

TROUBLE-SHOOTING PROGRAM (15)

Test throttle-valve switch (idle).

Detach control-unit plug from idle-speed regulation.
See top picture, arrow.

Detach EI-K control-unit plug and connect ohmmeter to term. 7 and vehicle ground.
See center picture, arrow.

Accelerator pedal in off position.

Set value: approx. 0 Ω
(continuity)

Accelerator pedal in part-load position.

Set value: infinity Ω
(open-circuit)

Is set value attained?

N>

1. Disconnect plug connection from throttle-valve switch.
See bottom picture.
Connect ohmmeter to term. 1 and term. 2 of plug connection (throttle-valve side).
Accelerator pedal in off position.
Set value: approx. 0 Ω
(continuity)

Accelerator pedal in part-load position.

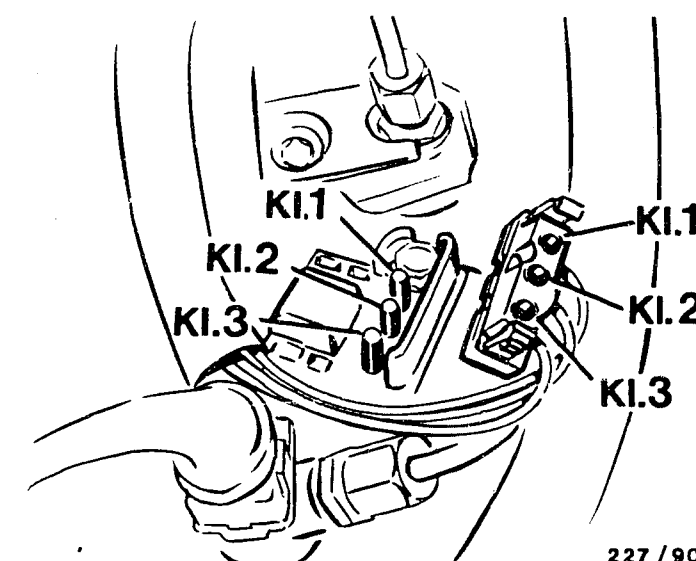
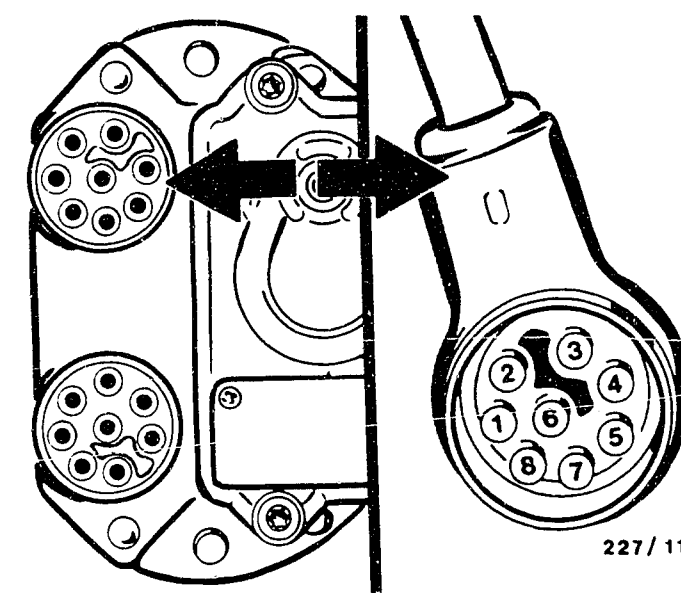
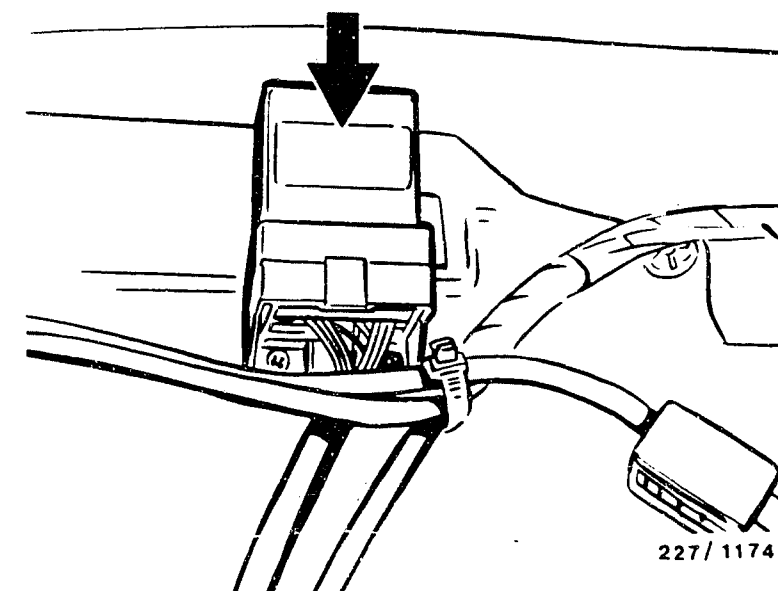
Set value: infinity Ω
(open-circuit)
Renew throttle-valve switch if set value is not attained.

2. Consecutively connect ohmmeter to plug connection (wiring-harness end), term. 1 and EI-K control-unit plug, term. 7 or plug connection, term. 2 (wiring-harness end) and vehicle ground.

Set value: approx. 0 Ω
(continuity)
Eliminate open-circuit if set value is not attained.

3. Connect ohmmeter to term. 7 of EI-K control-unit plug and vehicle ground.

Set value: infinity Ω
(open-circuit)
Eliminate short-circuit to ground if reading is approx. 0 Ω .



Return to trouble-shooting chart B04

TROUBLE-SHOOTING PROGRAM (16)

Test throttle-valve switch
(full load).

Detach KE-Jetronic control-unit
plug.
See top picture, arrow.

Detach EI-K control-unit plug
and connect ohmmeter to term. 8
and vehicle ground.
See center picture, arrow.

Accelerator pedal in full-load
position.

Set value: approx. 0 Ω
(continuity)

Accelerator pedal in part-load
position.

Set value: infinity Ω
(open-circuit)

Is set value attained?

N>

1. Disconnect plug connection from
throttle-valve switch.
See bottom picture.
Connect ohmmeter to term. 3 and
term. 2 of plug connection
(throttle-valve side).
Accelerator pedal in full-load
position.
Set value: approx. 0 Ω
(continuity)

Accelerator pedal in part-load
position.

Set value: infinity Ω
(open-circuit)

Renew throttle-valve switch if set
value is not attained.

2. Consecutively connect ohmmeter
to plug connection (wiring-harness
side), term. 3 and EI-K control-
unit plug, term. 8 or plug
connection, term. 2 (wiring-harness
side) and vehicle ground.

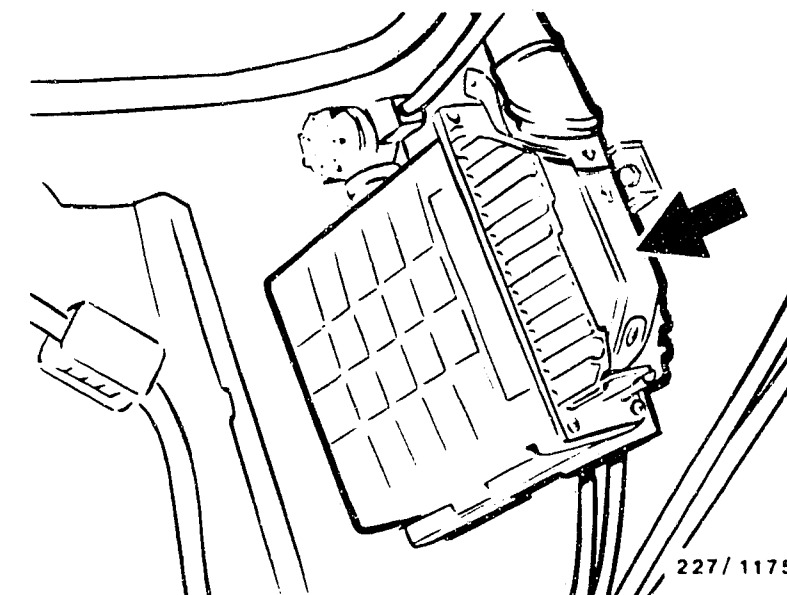
Set value: approx. 0 Ω
(continuity)

Eliminate open-circuit if set value
not attained.

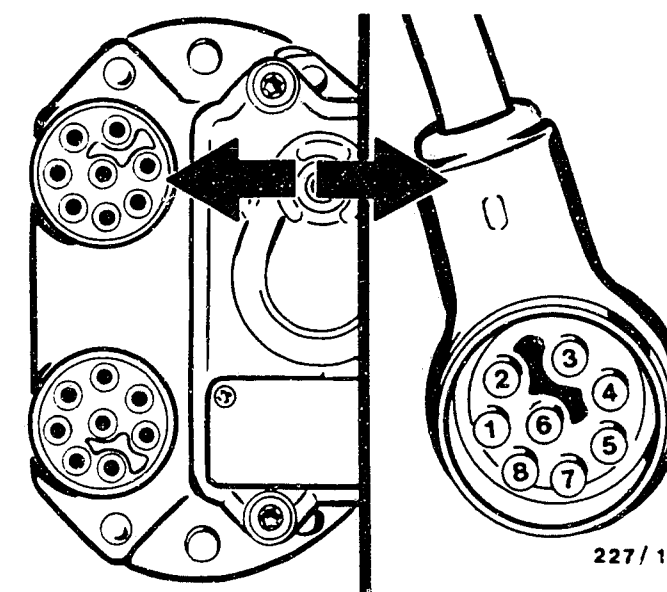
3. Connect ohmmeter to term. 8 of
EI-K control-unit plug and vehicle
ground.

Set value: infinity Ω
(open-circuit)

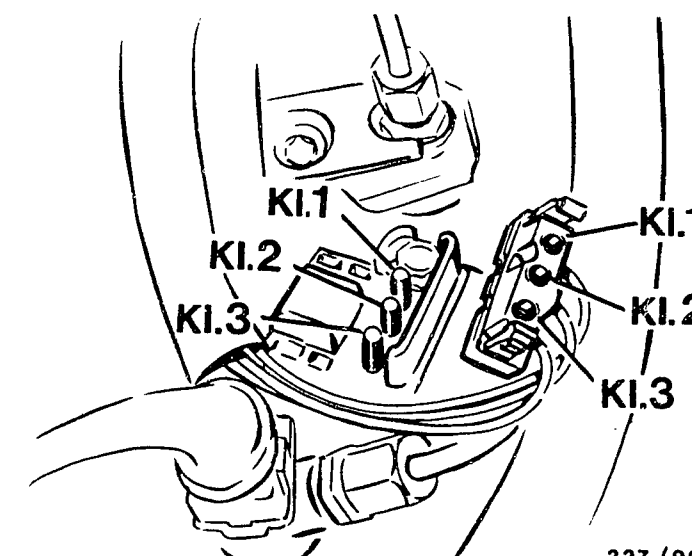
Eliminate short-circuit to ground
if reading is approx. 0 Ω .



227/1175



227/1166



227/908

Return to trouble-shooting chart
B04

DANGER OF ACCIDENT ON SEMI-
CONDUCTOR IGNITION SYSTEMS

| 22 |
VDT-I-227/102 En
03.1981

Supersedes Feb. 3, 1976 edition

Please be sure to pass this bulletin
together with VDE 0104/7.67 enclosed on to your
employees for their attention.

The increased demands made on their ignition
systems by modern engines, and the wish for freedom
from maintenance, led some time ago to manufacturers
starting to equip their vehicles with semi-conductor
ignition systems as original equipment.

In most cases, the performance of nearly all
makes of such systems is higher than that of
conventional systems, and further improvements are
to be expected. This means that semi-conductor
ignition systems have reached the point where
contact with "live" components or terminals
(whether on the primary side or the secondary side)
can prove fatal.

In this connection, we should like to point out
to you that the laws valid in your country
regarding work on high-voltage systems must
be adhered to when working on, or testing,
semi-conductor ignition systems.

As a matter of principle, when working on such
ignition systems, the ignition is to be
switched off.

Included in such work are the following operations:

- * Connection of engine testing equipment
(timing strobe, dwell-tach tester, ignition
oscilloscope etc.)
- * Replacement of ignition system components
(spark plugs, ignition coil, ignition
distributor, H.T. ignition cables etc.)

If it is necessary to switch on the ignition
in order to test the system or make adjustments
on the engine (to the carburetor, for instance),
then lethal voltages are present throughout
the entire system.

This means that the danger of accident exists
not only at the individual components in the
system (e.g. ignition distributor, ignition
coil, trigger box, ignition harness), but also
at the wiring harness (e.g. connection for the
tachometer, diagnostic connector), on terminals,
and on test equipment.

In addition, in the case of the capacitor-discharge
ignition system (CDI), danger of accident is also
present under the following circumstances:

- * Operation of the trigger box without the
ignition transformer.
- * At the trigger box, (removed), relatively
soon after it has been switched off
(capacitor discharge).

Below is a typical terminal diagram of a semi-
conductor ignition system, the dangerous
locations being marked with high-voltage arrows.

We would point out that all semi-conductor
ignition systems, even the older versions, are
to be regarded as dangerous in the sense as
defined by this bulletin.

EFFECTS OF ELECTRICAL AND
ELECTRONIC SYSTEMS ON HEART
PACEMAKERS

VDT-I-227/107 En
01.1981

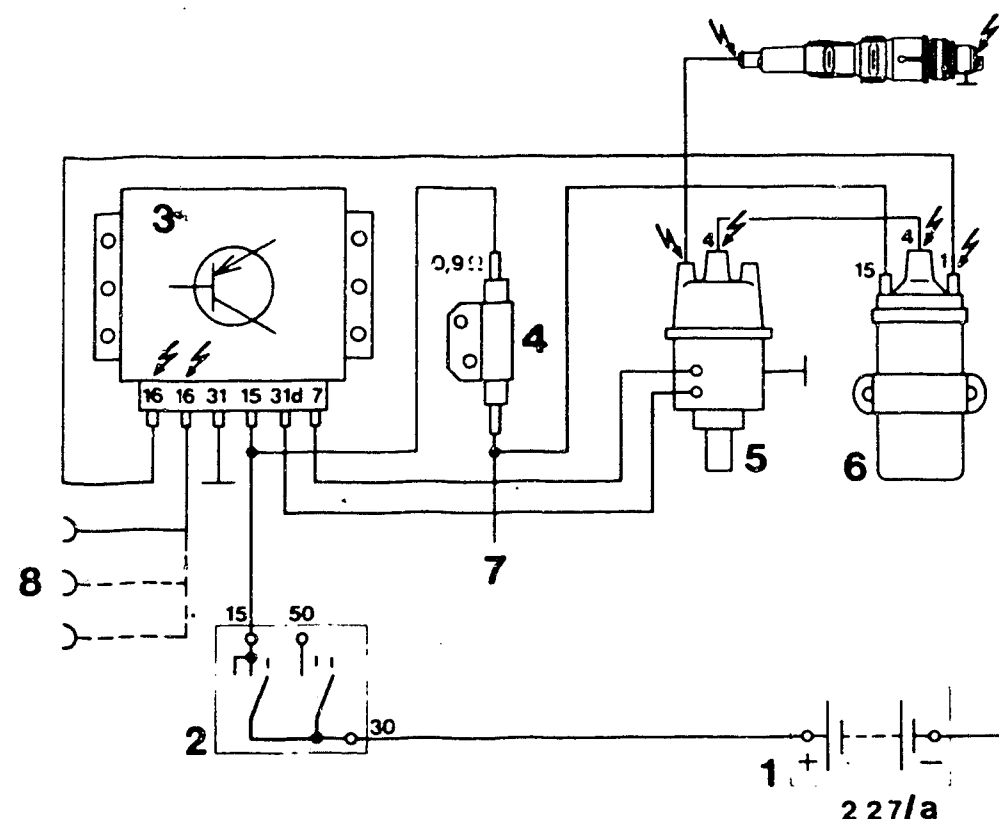
e.g. Ignition systems, Jetronic, Motronic, ABS

Please ensure that this Bulletin is passed
on to your employees for their attention.

We have often been asked by some of our
customers whether or not patients with heart
pacemakers are endangered in any way by
ignition systems. This theme was recently
the subject of an examination carried out by
the Ignition System Development Department of
Robert Bosch GmbH in conjunction with Dr.
Thull, lecturer at the Central Institute for
Biomedical Technology at the University of
Erlangen-Nürnberg and Biotronic GmbH & Co.
of Berlin, a manufacturer of heart pacemakers.
The magazine "Biomedizinischen Technik"
(5/80) published the results.

The most important discoveries in this practice
can be summarized from the examination report
as follows:

1. Heart pacemakers corresponding to the
latest state of the art are not affected
by radiation (electromagnetic fields) from
ignition systems.
2. With a stationary engine and the ignition
switched off, the heart pacemaker is not
affected by any part of the ignition system,
even when unintentionally touched. Main-
tenance work in the engine compartment, for
example, can then be carried out without
any danger.



- 1 = Battery
- 2 = Ignition/starting switch
- 3 = Trigger box
- 4 = Resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = to starting motor term. 15a
- 8 = to tachometer connection
or diagnostic plug
or TD terminal

Published by:

Robert Bosch GmbH
Division KH
After-Sales Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments
concerning the contents to our authorized
representative in your country.

3. With the engine running or stationary with the ignition switched on, touching current-carrying parts of the ignition system, as well as parts of any other electrical system, presents a certain danger for everybody. The heart pacemaker can here be affected under certain conditions (voltage, current and frequency). Patients with heart pacemakers should therefore at all costs avoid touching current-carrying parts of electrical systems.

4. Furthermore, patients with heart pacemakers are more inclined to psychic shock effects than other people, even when they receive just a harmless electric shock, because many such patients are conscious of the increased danger to the cardiac activity.

We therefore consider it inadvisable for patients with heart pacemakers to be employed in workshops or on vehicles where ignition systems are being tested or repaired. If any members of your staff have heart pacemakers, please introduce the necessary measures.

We would like to add that heart pacemakers are not expected to be affected in any way by interference from other electronic products and systems which we manufacture, such as the Antiskid System (ABS), Jetronic, Motronic, because the much greater radiation intensity of the ignition systems examined in normal use has not caused any interference to heart pacemakers corresponding to the latest state of the art.

If you should receive questions on this matter from customers, please inform them accordingly.

Published by:

Robert Bosch GmbH
Division KH
After-Sales Service Department for
Training and Technology (KH/VSP)

Please direct questions and comments concerning the contents to our authorized representative in your country.

NEW DESIGNATIONS FOR IGNITION SYSTEMS

VDT-I-227/108 En
01.1983
Supersedes 5.1981 edition

The introduction of new ignition systems has made it necessary to reclassify all designations.

The designations listed below will be used immediately in KH workshop and sales literature.

Designation	Abbreviated code	Meaning	Switching	Ignition ctrl. and spark adv.	High-voltage dist.
Coil ignition	ZS (CI)		Mechanical (breaker points)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistorized coil ignition	TSZ-K (TCI-c)	K=breaker-triggered	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Trigger box with conventional circuit techniques	TSZ-I * (TCI-i)	I=Induction-type pulse gen.	Electronic (trigger box)	Mechanical (ignition dist.)	Mechanical (ignition dist.)
	TSZ-H (TCI-h)	H=Hall generator	Electronic (trigger box)	Mechanical (ignition dist.)	Mechanical (ignition dist.)

Designation	Abbreviated code	Meaning	Switching	Ignition ctrl. and spark adv.	High-voltage dist.
Transistorized ignition	TZ-I * (TI-i)	I=Induction-type pulse gen.	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
(Trigger box in hybrid technique)	TZ-H * (TI-h)	H=Hall generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Breakerless semi conductor ignition with or without knock control	EZ (EI) (EZ-K) (EI-k)	K=Knock control	Electronic (trigger box or control unit)	Electronic (control unit)	Mechanical (ignition distributor or high-voltage distributor)
Distributor-less ignition with or without knock control	VZ (FEI) VZ-K (FEI-k)	K=Knock control	Electronic (control unit)	Electronic (control unit)	Electronic (dual-spark ignition coil, or 1 ignition coil for each spark plug)

* Note:

The ignition system can also be equipped with a DLS unit (digital idle stabilization) or with an ELS unit (electronic idle stabilization) or with an ESV unit (electronic ignition retardation).

MOTOR VEHICLE SERVICE INFORMATION

INCORRECT DISPLAY OF ROTATIONAL SPEED AND DWELL ANGLE ONLY WITH TRIGGER BOXES 0 227 100 .. (TCI-l, TCI-h) WITH CURRENT LIMITATION

VDT-I-Gen. 030 En
C2.1981

Supersedes ed. 6.1980

For additional information, see VDT-I Gen. 032 En

1. General

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period, the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle when testing the ignition system. However, there is no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Incorrect displays may occur with the testers listed below:

MOT 001.00	Rotational-speed	KTE 001.00
001.01	display O.K. with	001.02
001.02	these testers	001.03
001.04		
002.00		

By now, the following vehicles may be fitted with breakerless ignition systems with current limitation:

Audi	(Bosch/Fairchild ignition system)	Mazda	(Mitsubishi ignition system)
BMW	(Bosch ignition system)	Mitsubishi	(Mitsubishi ignition system)
Citroen	(Delco ignition system)	Nissan	(Hitachi ignition system)
Fiat	(Delco ignition system)	Datsun	(Bosch ignition system)
Ford	(Delco ignition system)	Peugeot	(Bosch/Fairchild ignition system)
General Motors	(HEI ignition system)	Bosch	transistorized ignition system for retrofitting
			0 227 100 920

Published by:

Robert Bosch GmbH
Division KH
After-Sales Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments
concerning the contents to our authorized
representative in your country.

2. Test instructions

2.1 Rotational speed

Incorrect rotational-speed display can be recognized as follows:

If one starts at the idle speed and slowly increases the engine speed, then the incorrect display can be recognized by an abrupt reduction in the rotational-speed display (e.g. from 2400 min^{-1} to 1200 min^{-1}).

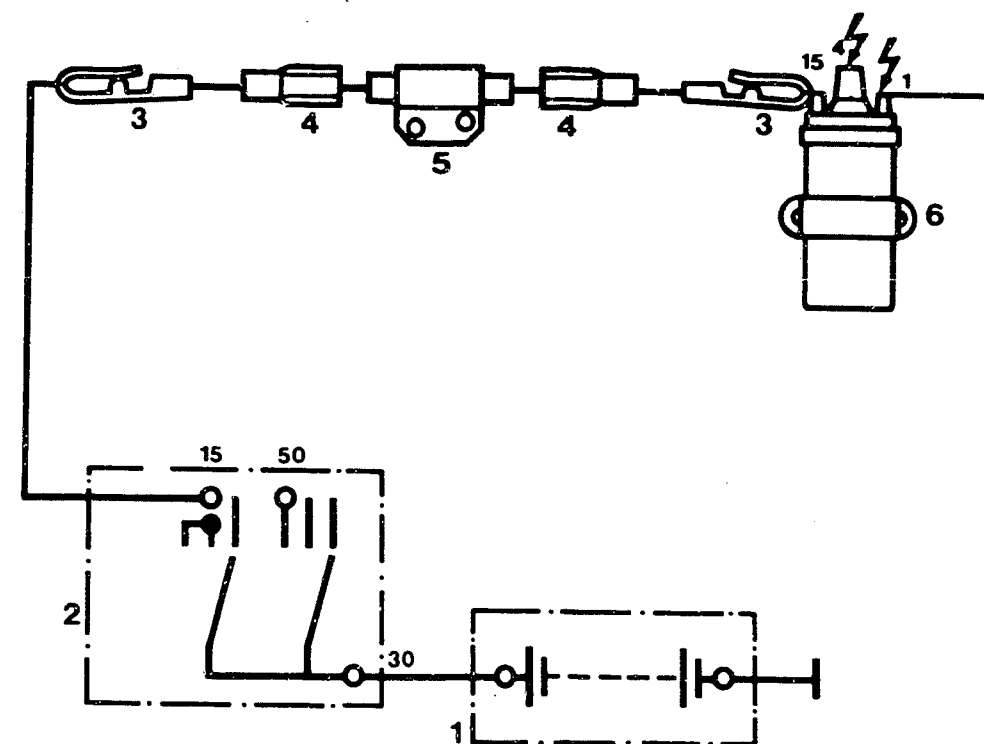
It is, however, possible to attain correct rotational-speed measurements:

Connect a ballast resistor of 0.9 or 1.0 Ohms (see Fig.) in series in the line to term. 15 of the ignition coil (take care not to cause a short circuit). After the rotational-speed measurement, the ballast resistor must be removed (otherwise starting difficulties and misfiring). Connect tester as per operating instructions.

Suggestion for user manufacture

Required parts:

1 ballast resistor 0.9 Ohms	Part no. 0 227 900 002
or	
1 ballast resistor 1.0 Ohms	Part no. 0 227 900 101
2 blade receptacles	Part no. 1 901 355 881
e.g. approx. 0.2 m cable, 1.5 mm ² e.g.	Part no. 6 210 150 150
2 insulated clips	Commercially available



- 1 = Battery
2 = Ignition/starting switch
3 = Terminals
4 = Blade receptacle
5 = Series resistor
6 = Ignition coil

Danger arrows: Warning: 400 V...25 KV

2.2 Dwell angle

The dwell angle is electronically controlled.
The dwell angle is no longer measured.

2.3 Ignition timing

Is correctly indicated. Tester connections according to operating instructions.

Published by:

Robert Bosch GmbH
Division KH

After-Sales Service Department for
Training and Technology (KH/VSK)
Please direct questions and comments
concerning the contents to our authorized
representative in your country.

TESTS ON ELECTRONIC IGNITION
SYSTEMS (TCI, TI)
TESTER INSTRUCTIONS

VDI-I-Gen. 035 En
03.1981

The following tests are listed in older
and current Tester operating instructions
or in "Trouble-shooting with the oscilloscope":

- * "Separate ignition coil test"
(Concerns EFAW 213, 214, 268, AE 2000)
- * Calculating the "ignition voltage reserve"
(Concerns EFAW 213, 214, 268, AE 2000
and MOT series).
- * "Intensified insulation test"
(Concerns EFAW 213, 214, 268, AE 2000
and MOT series).

Nowadays, transistorized ignition systems
deliver more than 30,000 V secondary voltage.

To avoid damage to ignition coil, ignition
cable and ignition distributor by voltage
flashovers, the tests listed above should
not be carried out on transistorized
ignition systems.

The contents of this Service Information has
already been published in the K7 Information
K7-VJF 17/8012.

Published by:
Robert Bosch GmbH
Division KH

After-Sales Service Department for
Training and Technology (KH/VSK)

Please direct questions and comments
concerning the contents to our authorized
representative in your country.

For production reasons:
continued on the following
coordinate.

For production reasons:
continued on the following
coordinate.

INDEX

Coordinates

Contact resistances	D05
Coolant temperature sensor	A21/B17 B25
EI-K control unit, ignition coil (idle) voltage	C23/D11
EI-K control-unit voltage	D11
High-tension side	C15
Ignition angle	D15
Ignition coil	C17
Ignition-distributor setting (high-tension side)	A23/C19
Knock sensors	A27/B19
Peak-coil-current cutoff	D09
Pressure sensor	B19/C01
Primary signal	D07
Primary voltage	D13
Primary-circuit voltage	C25
Pulse generator-cylinder recognition	B21/C03
Pulse-generator insulation	C27
Pulse-generator internal resistance	D01
Pulse-generator voltage	D03
Throttle-valve switch (full load)	A22/D19
Throttle-valve switch (idle)	A22/D17
Trans. overload protec. switch (doesn't close)	A25/B21 C07
Trans. overload protec. switch (doesn't open)	A25/B23 C11

CONTENTS

Section	Coordinates
Structure of this microcard.....	A01
How to use this microcard.....	A02
Special features.....	A03
Safety and precautionary measures.....	A05
Testers and tools.....	A13
Installation position of components.....	A17
How to use trouble-shooting chart and trouble-shooting program.....	B01
Trouble-shooting chart.....	B04
How to use self-diagnosis, self-diagnosis test table and trouble-shooting program.....	B07
Evaluation of flashing code.....	B09
Preparation for self-diagnosis.....	B11
Activation of self-diagnosis.....	B13
Self-diagnosis test table.....	B17
Self-diagnosis trouble-shooting program.....	B25
Trouble-shooting program.....	C15

CONTENTS (CONTINUED)

Section	Coordinates
Technical bulletins:	
Accident risk.....	N01
Effect of electrical and electronic systems on pacemakers.....	N04
New designation for ignition systems.....	N07
Motor-Vehicle Service Information:	
Indication of engine speed and dwell angle.....	N10
Testing of electronic ignition systems.....	N13
Index.....	N26

PUBLICATION INFORMATION

(c) 1988 ROBERT BOSCH GmbH Automotive Equipment -
After-Sales Service, Department of Technical
Publications KH/VDT, Postfach 10 60 50,
D-7000 Stuttgart 10.
Published by: After-Sales Service Department for
Training and Technology (KH/VSK).
Press date 08.1988.
Please direct questions and comments
concerning the contents to our authorized
representative in your country.
This publication is only for the use of the
Bosch After-Sales Service Organization and
may not be passed on to third parties without
our consent.
Microfilmed in the Federal Republic of
Germany.
Microphotographié en République Fédérale
d'Allemagne.